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Competition Uncovers Obsolescence

THE healthiest hens are not found where worms are plentiful and require but little scratching to uncover them. Slim picking develops rugged constitutions among barnyard inhabitants. This is to their advantage and prolongs their life, for muscular hens do not make easy eating.

Many a manufacturing concern will have a longer life because it has encountered the tough going of depression than it would have had if the easy times of the past few years preceding the slump had continued. Uninterrupted periods of prosperity have their disadvantages, as we are now finding out. They tend, among other things, to soften the competitive abilities and to develop managerial myopia, which favors the accumulative accretion of undetected wastes.

Competition is the most effective eye-opener that can be administered to industry. And business depressions are powerful stimulators of competition. As a consequence of our recent experiences, it is probable that more hidden wastes have been uncovered during the past 18 months than were found in the entire prosperity period preceding them.

Hidden waste in obsolescence, in particular, is revealed under these conditions. Inferior equipment can "get by" during easy times, but when the test of real competition comes, its deficiencies become manifest. Industry must lean heavily upon its equipment. It needs a strong staff and not a broken reed for its support.

Far-sighted management, with an eye to future profits, is welcoming this chance to weigh equipment in the balance of competition, and this opportunity to replace it at a time when conditions permit this being done at a minimum investment of money and disruption of production schedules.

Now is the "appointed time" to replace equipment and rehabilitate plants. We shall be too busy to do this as economically later on.

PROFITABLE DEPRESSION

ONE frequently hears the question asked, "What should our policy be with respect to rehabilitation, replacements and extensions in periods of depression?"

In spite of all prognostications to the contrary, business continues to move in cycles and has been doing so for a long period of time, and while the amplitude and pitch of these cycles may vary, there is no present evidence that the cyclical phenomena of business will completely disappear. Such being the case, there will be alternate periods of prosperity and intense activity, and of depression with liquidation, low activity and periods of readjustment.

There are, therefore, several basic considerations prerequisite to the formulation of sound policies with respect to plant investments during periods of depression.

1. Manufacturers should be familiar with the operation of the business cycle and the effect that the various phases of the cycle will have on their business and that of their customers.

2. Each manufacturer should study and determine the normal rate of growth of his business, as there usually is a normal rate for a normally healthy business. The facts and records should be studied for a period of years, corrected for abnormalities, with a view to developing a curve which can be projected into the future with reasonable certainty that it represents the facts and is a correct trend.

3. Due to constantly changing world economic conditions which, of course, are reflected in the business cycle, each manufacturer should study these with a view to interpreting their probable effect on his individual situation and orient and adjust himself accordingly.

With a reasonable knowledge then of the approximate position we are in in a given cycle and with the knowledge of the normal trend and rate of growth, it is possible to so arrange the financial program that definite commitments can be entered into at the time when it is believed full advantage can be taken of the low swing of the business cycle. For it is during such periods that commodity prices are usually at their lowest, labor is plentiful, and contracts can be entered into for the acquisition of such additional facilities as may be required during the next upswing of the cycle.

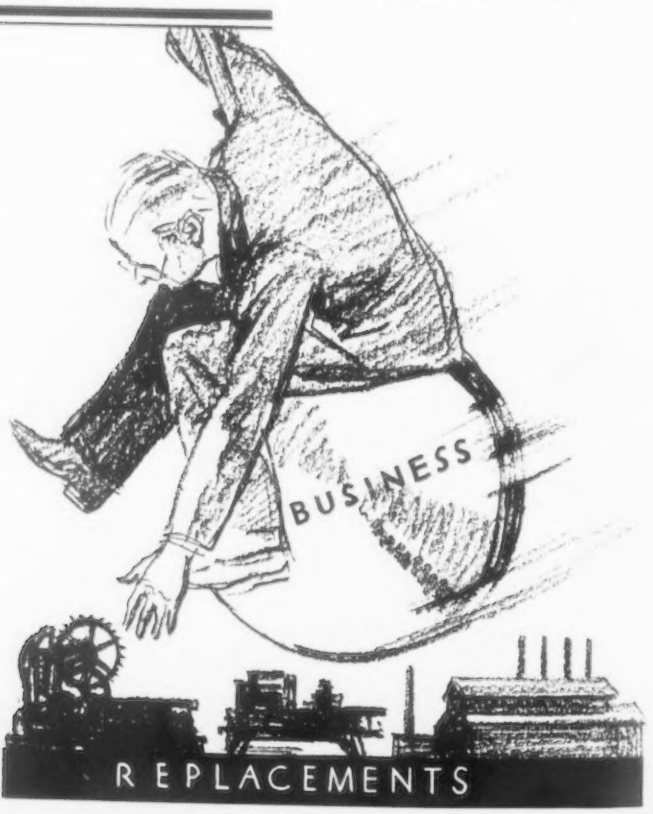
A policy of rehabilitation of existing facilities and replacement of obsolete equipment and acquisition of new equipment during periods of depression has another advantage, besides that of low fixed charges on the invested capital, namely, it does not interfere with maximum production during peak periods. All too frequently manufacturers in feverish haste and at exorbitant expenditure attempt, by the creation of additional facilities, to take advantage of a run-a-way market only to find they have been chasing a will-o'-the-wisp, for the facilities are not completed, coordinated and in smooth operating condition before the low phase of the business cycle is entered into.

Planning ahead and forecasting periods of depression are essentially sound business. Quite frequently during periods of depression cash surpluses are at the highest. Money can be obtained by soundly operated and financed companies for additional fa-

ONE of the oldest and surest rules for successful human endeavor has been to take advantage of the times.

There are profits to be made during all of the varying stages of the business cycle, but the way of making them varies with the changing conditions ushered in by its fluctuations. By planning its activities for depressions as well as for prosperity periods, management makes the greatest headway in the long run.

Mr. Coes tells, in this article, what management can and should do with respect to plant rehabilitation, extension and replacement, in times of depression.



POLICIES

By HAROLD VINTON COES
Manager, Industrial Department
Ford, Bacon & Davis, Inc., New York

cilities at lower rates and more care and thought can be given to the essential requirements of the new facilities to be created during periods when the organization is not under heavy pressure. Fewer mistakes are likely to be made in carrying out the program.

Plant equipment and methods become obsolete in this era of rapid application of the results of scientific development and research and a manufacturer cannot afford, usually, to produce with anything short of the best. During periods of intensive activity sufficient spread may obtain between the cost of production and the selling price to cover up high costs due to obsolescence, but, during the periods of readjustment and of depression when competition is keenest, obsolescence, where it exists in considerable degree, places that manufacturer in the marginal producing class and makes it impossible for many to operate at a profit.

Therefore, at the end of the periods of intense activity present methods and the plant and its productive facilities should be studied with a view to determining, on a commercial basis, the penalty imposed by reason of obsolescence of the facilities and methods and a program developed for rehabilitation during the next period of depression.

The plant can be rearranged, bottle necks in production and in material handling eliminated, deferred maintenance cared for and modern requirements for normal future activity determined. This requires, of course, careful planning ahead, the determination of the project to be entered into on the basis of its merits, the courage to realize that history repeats itself, and that depressions do not last forever; the courage to go ahead with prearranged financial resources to carry out well developed constructive programs. The irony of this is that, if such programs were formulated and carried out, it would do much to accelerate recovery and each manufacturer would be contributing essentially not only to the general recovery, but to the specific recovery in his own business.

There are a number of far-sighted organizations who put such policies into practice. The Simonds Saw & Steel Co., Fitchburg, Mass., for example, has publicly announced its plan. It stated in a recent issue of the *Executives' Service Bulletin* of the Metropolitan Life Insurance Co.:

"We are building at this time for two reasons. In the first place our study of the economic situation has brought us to the firm conviction that business is at the lowest ebb of the recent recession and that recovery shortly will be well under way. It has always been a policy of our company, and one of proved success, to execute our building expansion program when general business is dull and prices are low. In the second place, research has demonstrated beyond doubt that the type of building we are now erecting will result in lower production costs. We estimate that the increase in efficiency of production resulting from concentrating the manufacturing activities of the three old style plants into the new one, embodying all new principles and worthwhile ideas, will be at least 33 per cent."

If these estimates are correct, and they seem to be predicated on careful thought and study, this company will be in a position at the beginning of the next period of activity to produce with its new facilities at a considerably reduced cost, and will probably prove to be very formidable competition in the industry of which it is a part.

Some forward-looking public utility companies and

(Concluded on page 990)

Research—the Only Defense Against Inter-Commodity Competition

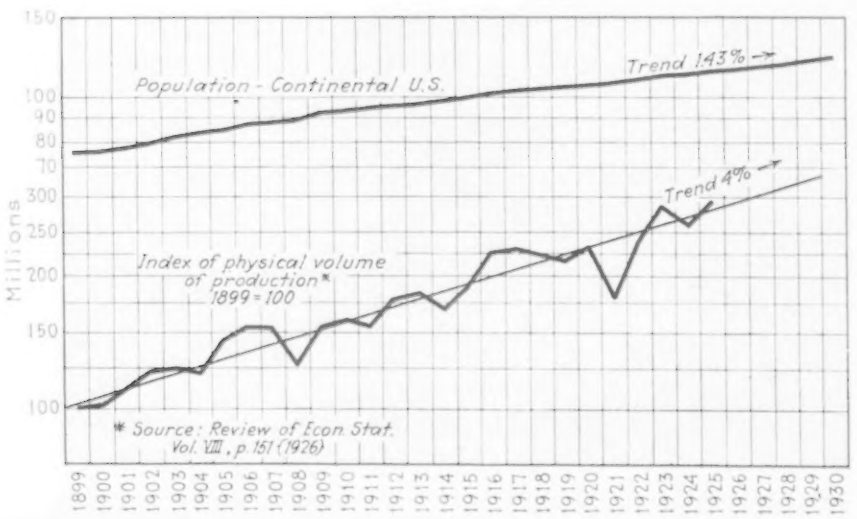
INTER-COMMODITY competition is a new phrase, but it describes a situation that is essentially as old as industry. It is the increasing frequency with which this type of competition occurs and its growing seriousness in certain fields that make it worthy of investigation now. For inter-commodity and inter-process competition vitally affect not only sales managers and engineers but also research directors, bankers, and investors.

This paragraph from the pen of Theodore M. Switz, chemical economist, Lehman Corpn., New York, leads into a discussion of the topic in *Chemical and Metallurgical Engineering*. So applicable is the story to industry in general that we reproduce the article, in abbreviated form, herewith:

It is the purpose here to inquire into the factors common to the various cases, to consider their general economic significance, and to note the probable future trend. Of course, this phenomenon is known in all industries—for example, the competition between pipe lines and railroads, or between different varieties of breakfast foods—but it is in the process industries that it reaches a classic and typical form.

How a New Product Gets a Foothold

Essentially, this type of competition is based on the development of a new product with physical, chemical, and economic properties sufficiently like those of another to be able to compete and take a share of the latter's market. Or a new process is worked out which, under certain conditions, is able to produce an old commodity more satisfactorily than by the methods in general use.



PHYSICAL VOLUME OF PRODUCTION IS INCREASING ALMOST THREE TIMES AS FAST AS IS THE POPULATION OF THE UNITED STATES.

To explain the origin and full significance of inter-commodity competition it seems necessary to go back to certain economic fundamentals whose apparent triteness conceals their importance. Commodity production and distribution in the modern world have become so complex, and each in turn is subdivided into so many seemingly independent branches, that one tends to get the impression that production is carried on merely for its own sake.

In feudal economy, social relations were more direct and technology simpler, so that it was obvious to everyone that work was carried on for four primary reasons: to provide man with (1) foodstuffs, (2) housing and shelter, (3) clothing, (4) means of amusement or enjoyment. Tools were used, but they were sufficiently simple so that their direct relation to the production of consumers' goods was evident.

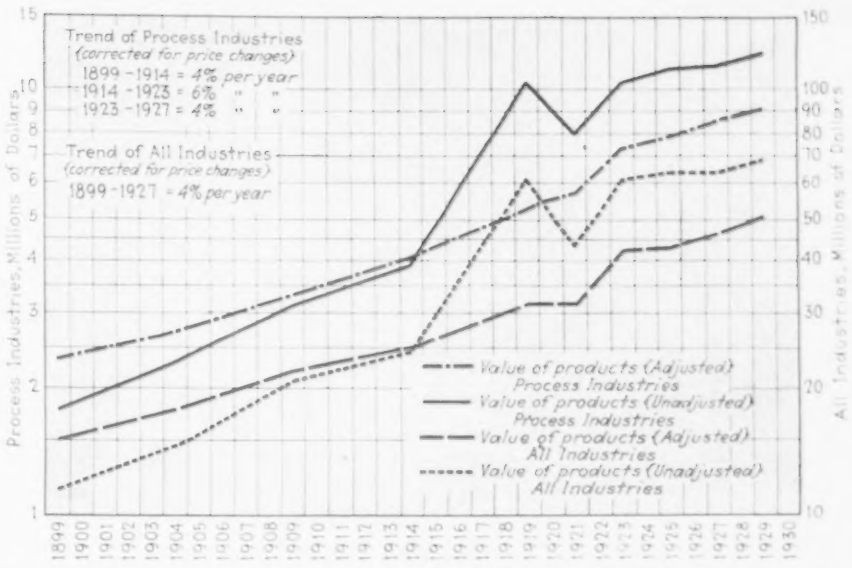
The foundation of economic activity—the satisfaction of man's wants—has not changed from that time to this; the mainspring of our entire elaborate productive mechanism is still the satisfaction of these four broad but simple needs.

Great Growth of Industrial Production

But during the past two centuries great changes in the methods of production have taken place, and instead of a more or less constant amount of goods turned out each year, output has continually expanded. The manufacture of machines and other products used in the production of articles of consumption has developed until today it is represented by a whole series of apparently independent industries whose products are known as producers' goods. The relation of the growth of these industries to the expansion in the output of consumable goods, however, is obscured by the continually increasing technique of production and by the spread of modern manufacturing methods to all the backward quarters of the globe.

From this discussion it is obvious that there is an important distinction between consumers' goods and producers' goods, and that the output of any particular branch of the latter may not be increased indefinitely and independently but only in relation to the former. In other words, at any given time, the market for producers' goods has definite limits, although the truth of this statement may not be apparent dur-

COMPETITION of one product with another, such as structural steel vs. concrete, has been a bone of contention and is becoming more so. Dr. Switz, who is studying this subject in some detail, believes that the future will see this condition aggravated, and that the manufacturer's only defense is a well conducted, scientific research program. He believes, however, that of necessity market research will have to go hand in hand with the scientific side.


Trend of Process Industries
(corrected for price changes)
1899 - 1914 = 4% per year
1914 - 1923 = 6% " "
1923 - 1927 = 4% " "
Trend of All Industries
(corrected for price changes)
1899 - 1927 = 4% per year
Value of products (Adjusted) Process Industries
Value of products (Unadjusted) Process Industries
Value of products (Adjusted) All Industries
Value of products (Unadjusted) All Industries
Process Industries, Millions of Dollars
All Industries, Millions of Dollars

PROCESS INDUSTRIES ARE SLOWLY INCREASING THEIR PROPORTION OF ALL INDUSTRY. THEY MADE SUBSTANTIAL GAINS IN THE DECADE COVERING THE WORLD WAR

ing "new eras." This has a very direct bearing on the process industries, for, taken as a whole, they are outstanding examples of the producers' goods type.

Planning Production for Future Markets

ASIDE from the absolute size of the markets for a given product, it is important to know how rapidly the existing market will increase from year to year. For the output of a product sold in a saturated market can increase no faster than the market itself expands. How rapidly is that most fundamental of all criteria of growth, the population of the United States, increasing? The accompanying chart shows the census figures and estimates for the last 30 years. The slightly concave-downward shape of the curve indicates a slowly declining rate of growth. Indeed, calculation shows that the average rate of increase in population during the period 1900-1925 was 1.68 per cent annually, whereas a similar calculation for the decade 1920-1930 yields an average growth of only 1.43 per cent a year.

On the other hand, production, as would be expected, increased more rapidly. The general index of manufactures shown on the chart indicates that production (which in the long run must be the equivalent of consumption) gained an average of 4 per cent each year during the first 25 years of this century.

Unfortunately, this index is no longer available, but a general production index published by *Standard Statistics* shows an average growth of 3 per cent annually between 1910 and 1930, the difference being due principally to the differing weighting of the various series included. But either of these basic growth figures seems modest.

This is another factor that lies at the foundation of inter-commodity competition. For while newly developed products may show rates of growth as high as 20, 50, or even 100 per cent a year during their first few years, while expanding into relatively new markets, this is not at all typical of the old and well-known bulk products of industry. Yet, for vitally important economic reasons, which we have not space to discuss here, every manufacturer strives to expand his output as steadily and as rapidly as possible.

Repercussion with Overproduction

Here there is a link between inter-commodity competition and that bogey of modern industry, overproduction. In the economic sense, over-production does not mean the production of more commodities than people can use, but rather the production of larger quantities than the market can absorb at a profit to all the producers. The standard recommendation for a manufacturer faced with general overproduction or slow growth due to operating in a closed market is diversification and the development of new products. This is possible to a certain extent in any industry; for example, General Motors' entrance into the radio manufacturing field.

The scientific research laboratory is a tool of both offense and defense in the higher strategy of inter-commodity competition. It serves its firm in opening up new fields and in guarding against attack in old ones. This is recognized by some of the more progressive companies.

Research Laboratory Needs Logical Guidance

It has become so much of a fad nowadays to maintain a research laboratory, however, that the mere ownership of one cannot be considered to guarantee in any way that sound scientific and economic policies are being followed. Unsound programs, resulting either from the research director's unfamiliarity with economics or from the executive officers' lack of knowledge of technical matters, have definitely contributed to inter-commodity competition and overproduction in certain fields. In the present era, if economic planning and guidance are absent, a research laboratory may fail in its function and occasionally prove to be useless or even a boomerang.

One of the most important purposes of a research laboratory is to make possible that growth which

(*Concluded on page* 990)

Tool control register installed in a tool crib to keep record of all tools issued for use in the shop

Keep Down Tool Losses by Use of Adequate Records

By N. D. WOODS

Industrial division, Ohmer Fare Register Co., Dayton, Ohio

MAXIMUM production with minimum tool cost can be effected only through well planned production schedules and systematic control of the contributory factors which are vital in factory production. One of the most essential contributory factors is the making of high-grade tools. Before production can begin, it is necessary that expensive jigs, fixtures and miscellaneous tools be stocked in the various tool cribs so as to be obtainable by the production departments when required.

For the past quarter century the Ohmer Fare Register Co., Dayton, Ohio, has each year invested hundreds of thousands of dollars in tools for the sole purpose of manufacturing various recording devices of precision. New inventions or developments naturally necessitate new tools. Today the company has over 100 high-grade toolmakers who are making new tools, so that new and up-to-date features may be incorporated in the manufacture of its products.

Reducing Expensive Tool Losses

To manufacture products of extreme accuracy, the management, as well as those directly in charge of factory production, were not content to stock high-grade tools, representing over 50,000 tool units, at an expenditure of several million dollars, without making a special effort to install some mechanical system of control which would reduce tool losses to a minimum.

As a result of investigations the Class 800 register was applied recently as a mechanical medium for controlling the inventory of tools. Installed in the tool crib, this register unquestionably has reduced tool losses to a minimum. It also has permitted reducing the tool investment and enables a perpetual tool inventory to be kept with a minimum of detail work. It is no longer necessary to spend money for a supply of tool order forms, and this register tool control system also eliminates the use of the brass tool check system.

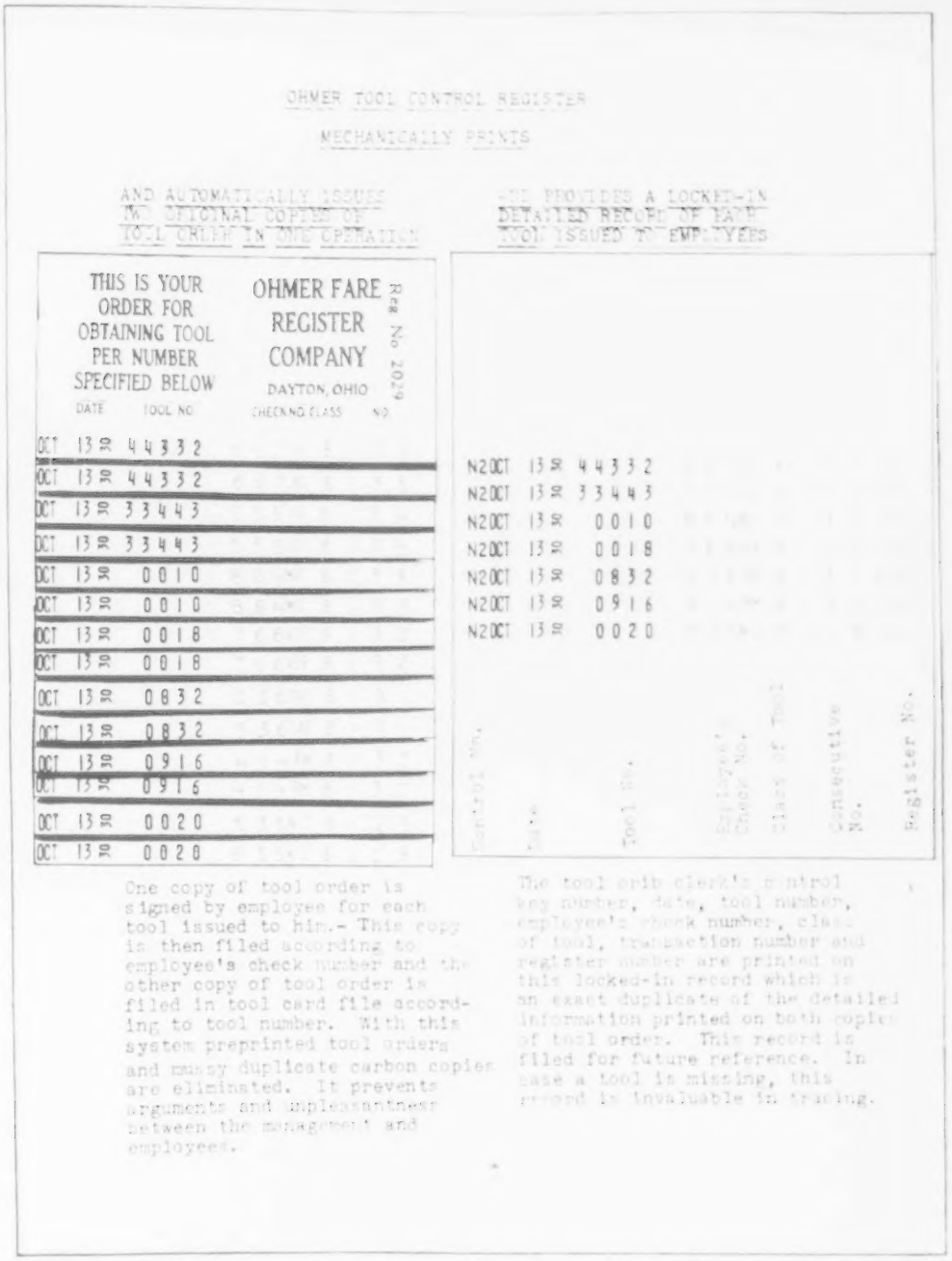
Complete Information Available

This tool control register mechanically prints and issues two original copies of the tool order. Each copy of this tool order gives in printed form the following information:

The date (month, day and year) tool was issued to workman.
Tool number.
Employee's check number.
Class of tool.
Transaction number.
Register number.

One copy of the tool order is handed to the workman, who signs for the tool issued to him. This copy is then filed by employee's check number and returned to the workman when he returns the tool. The other

BY keeping definite record of where all tools are, with receipt signed by the man taking them from the tool crib, one company has practically eliminated its losses on this score. And the signature disposes of all arguments.


OHMER TOOL CONTROL REGISTER
MECHANICALLY PRINTS
AND AUTOMATICALLY ISSUES TWO ORIGINAL COPIES OF TOOL ORDER IN ONE OPERATION
AND PROVIDES A LOCKED-IN DETAILED RECORD OF EACH TOOL ISSUED TO EMPLOYEES
THIS IS YOUR ORDER FOR OBTAINING TOOL PER NUMBER SPECIFIED BELOW
OHMER FARE REGISTER COMPANY
DAYTON, OHIO
REG. No. 2029
DATE TOOL NO. CHECK NO. CLASS NO.
OCT 13 30 44332
OCT 13 30 44332
OCT 13 30 33443
OCT 13 30 33443
OCT 13 30 0010
OCT 13 30 0010
OCT 13 30 0018
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OCT 13 30 0832
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Control No.
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Check No.
Class of Tool
Consecutive No.
Register No.
One copy of tool order is signed by employee for each tool issued to him.- This copy is then filed according to employee's check number and the other copy of tool order is filed in tool card file according to tool number. With this system preprinted tool orders and messy duplicate carbon copies are elminated. It prevents arguments and unpleasantness between the management and employees.
The tool crib clerk's control key number, date, tool number, employee's check number, class of tool, transaction number and register number are printed on this locked-in record which is an exact duplicate of the detailed information printed on both copies of tool order. This record is filed for future reference. In case a tool is missing, this record is invaluable in tracing.

copy of the tool order is filed in the tool card file according to tool number. The signing of one copy of the tool order by the employee prevents arguments.

Locked-In Record

The information printed on copies of the tool order is printed also on the locked-in record of the register This record is filed for future reference and is invaluable in tracing tools. The transaction number on this detailed record gives the number of tools issued to employees over any period of time desired.

Each workman knows that any tools charged against him and not turned in will be taken out of his pay check—thus the low tool loss. The mechanical printed records furnished by the tool control register reduce arguments to a minimum, and also effect a considerable saving of time in tracing tools. In the short time that the tool control system has been installed in the Ohmer plant, it has more than paid for itself in the saving involved by reducing tool investment, keeping down tool losses, and saving time in issuing tools.

Open-Hearth Steel Process as a

By ERIC R. JETTE

Associate Professor of Metallurgy, Columbia University, New York

TO control a chemical process by other than empirical, rule of thumb methods, two types of knowledge concerning the reactions involved must be available: (1) the thermodynamics of actions, and (2) by no means less important for efficient operation, the mechanisms and kinetics of the reactions.

Information on the thermodynamic side enables the operator to decide upon initial and final conditions, whether heat must be added to or removed from the system, whether the reactions proceed farthest in the desired direction at high pressure or low, etc. Knowledge of the mechanisms involves the determination of the individual steps by which an initial set of reactants, under given conditions, proceed to give the desired final products. And kinetic studies upon which the mechanisms are based give the speed at which these reactions or steps take place.

Thus thermodynamic studies of a reaction enable the operator to control the direction and extent to which the reaction can proceed, while kinetic studies enable him to control rates and thus the time efficiency of the operations. The thermodynamics set the limit to which the reacting system approaches; the kinetics tell how fast the system actually approaches this limit. The two types of information are complementary and not antagonistic, even though in discussing the mechanism the introduction of thermodynamics is entirely needless and generally of no assistance, while in thermodynamic studies mechanism need not even be mentioned.

Heterogeneous Reactions

The thermodynamic side of metallurgical reactions has received much attention in the past; the mechanisms, relatively, very little. The main reason for our present lack of information on the mechanisms of these reactions lies in the fact that every one of importance is a heterogeneous reaction. That is, the substances involved in the reaction exist in more than one phase, while, if we neglect the large amount of work which has been performed on certain surface reactions ("contact catalysis"), our most reliable experiments and theoretical investigations have been carried out in homogeneous systems.

[Many differential equations are developed by the author to cover various phases of the process as he has analyzed it, and to show the influence of one factor reaction after another, as well as the effects of diffusion. The whole thing sums up in his equation 5 appearing here.]

Summary

AN attempt has been made to analyze the complex set of reactions and processes comprised in the open-hearth steel process. The major premise in this analysis was that the mechanism of the carbon oxidation—*i. e.*, the rate-determining reaction—is FeO + C ⇌ Fe + CO and that this reaction takes place in the molten metal. On this basis we have concentrated upon the reactions and processes that supply or remove FeO from the metal bath. Again it must be emphasized that, if FeO is not involved in the rate-determining reaction, all that has been said may be discarded immediately and another approach must be made to the problem on the basis of a different mechanism.

As each new reaction that affected the FeO content of the metal was discussed, it was pointed out that according to the present method of approach, we should add another term to equation 5.

[That equation reads

$$\left(\frac{d[FeO]_M}{dt}\right)_{total} \quad \left(\frac{d[FeO]_M}{dt}\right)_{react.} + \left(\frac{d[FeO]_M}{dt}\right)_{diff.}$$

and expresses the fact that the results of reaction and diffusion make up the total of the effects studied.]

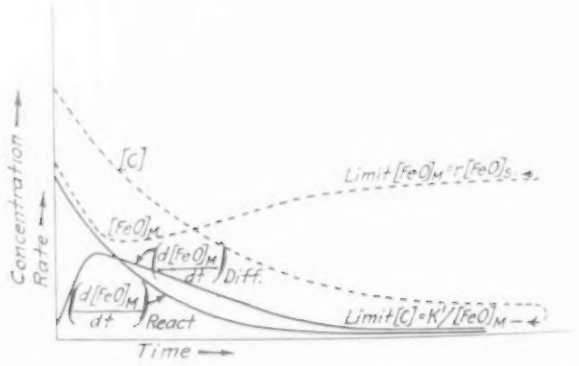

Fig. 1—Hypothetical diagram, assuming high initial concentration of FeO in the metal; lower initial rate of diffusion than of reaction; backward reaction negligible.

Problem in Chemical Kinetics

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IN a paper before the American Institute of Mining and Metallurgical Engineers, a brief abstract of which is given here, Professor Jette developed, step by step, a number of formulas to portray mathematically the principal reactions occurring during the progress of an open-hearth heat. The temperature was purposely omitted as introducing too complicated a system.

▼ ▼ ▼

It is now appropriate to set down equation 5 modified in this way, but also including the last equation for the diffusion rate to illustrate how complex and unwieldy the result becomes. The following equation, however, is by no means the most complicated form that an equation which attempts to be a general representation of the open-hearth process might assume, even when limited to working and finishing periods:

$$\left(\frac{\partial[FeO]_M}{\partial t}\right)_{total} = \frac{d[C]}{dt} + \left(H_o + \Delta H_{\substack{phys.\\cond.}}\right)$$

$$\left[[FeO]_o + \Delta[FeO]_{ox.Si} + \Delta[FeO]_{ox.Mn} - [FeO]_{red.}\right.$$

$$\left.\frac{[FeO]_{Mn} + \Sigma\Delta[FeO]_{M\,cond.}}{\tau + \Sigma\Delta\tau_{\substack{chem.\\comps.}}}\right] + \left(\frac{\partial[FeO]_M}{\partial t}\right)_{Si} +$$

$$\left(\frac{\partial[FeO]_M}{\partial t}\right)_{Si} + \left(\frac{\partial[FeO]_M}{\partial t}\right)_{P} + \left(\frac{\partial[FeO]_M}{\partial t}\right)_{Ox.Si}$$

The subscript o refers to initial conditions, the others in order from left to right refer to physical conditions, diffusion, Fe_2O_3 reduction, ore addition, chemical composition, manganese, silicon and phosphorus oxidation and Fe_2O_3 reduction.

Complete Equation Has Many Variables

On the basis of our major premise the open-hearth process is a series of processes for the purpose of changing the FeO content of the metal. In this series the oxidation of carbon is only one incident, even though it may be the major problem for the steel manufacturer. When it is realized (1) that each one of the terms on the right of the equation is itself a complex quantity, (2) that nothing has been said about carbon elimination by the reaction $MnO + C \rightleftarrows Mn + CO$ and similar reactions, (3) that there is no term covering the oxidation of FeO in the slag by furnace gases and (4) that the equation holds only for constant temperatures, it is seen that the derivation and application of a general equation, which must of necessity include the temperature factor, is indeed almost hopeless.

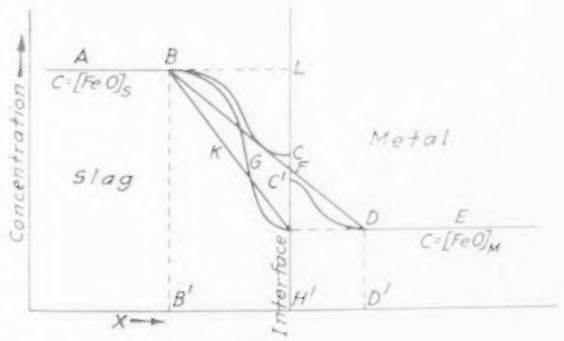


Fig. 2—Curves of concentration gradient varying on the two sides of the interface—A B C and C' D E being an example.

Nevertheless there are certain values to be gained from such an analysis, which may be enumerated in part as follows:

1. From the kinetic standpoint a knowledge of the FeO content of the metal during the various stages of the heat is even more important than carbon content.

2. The application of diffusion constants, whether determined in the laboratory or from open-hearth data, is more than likely to lead to false results, because of the impossibility of measuring and controlling certain physical and mechanical conditions which determine the actual value and which vary considerably from heat to heat and furnace to furnace. As far as the diffusion process is concerned, the phrase "under comparative conditions" means little or nothing.

Handling Over-Oxidation

3. As long as open-hearth practice continues in the use of highly oxidizing finishing slags "over-oxidation" is unavoidable. The rate of diffusion of FeO

(Concluded on page 991)

Advances in Chucking Equipment

By J. W. MARSHALL

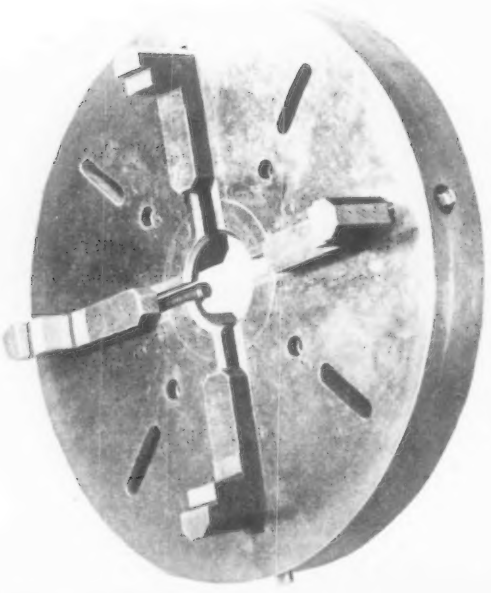
DURING the past decade many important advances have been made in the design and construction of chucks for lathes, boring mills, drill presses and other machine tools. The nature and extent of these advances have not, however, been generally appreciated. This statement is based upon the fact that, on many modern machine tools of a size and power never before thought necessary, chucks of an earlier period, whose limitations in no wise fit them to stand up to the capacities of the machines, are frequently used.

It is manifestly as uneconomical to restrict the capacity of a high-power machine by inadequate chucking facilities as to restrict its capacity by the use of the cutting tools of an older generation. No one would think of doing the latter; yet, unthinkingly, the former is often done. The fact is that improvements in chucking equipment have fully kept pace with machine tools in general, and, although old chucks and new ones look a great deal alike, the chuck of today is of very different character.

Steel has replaced cast iron as the material for bodies, because of greater strength and other desirable properties. Bearings are larger and Alemite or other oilers have been incorporated to assure adequate lubrication. Heat-treated alloy steels have largely supplanted machinery steel for jaws, screws and other working parts. Furthermore, a degree of accuracy not demanded heretofore has been incorporated in the chucks, and this initial accuracy has been so protected by good designing that it will remain an inherent characteristic for a long time. These improvements adapt the chuck to the higher productiveness of modern machine tools and to modern high-speed steel and hard alloy cutting tools; so basic are these improvements that a chuck that was adequate for a specific job ten years ago may be hopelessly inadequate for the same job today.

Another restriction on maximum production lies in the use of worn chucking equipment. The life of a chuck depends upon the character of the work it is called upon to perform. On work requiring some little time for the cutting operation, a chuck may have a life of 10 to 15 years, while on production work calling for frequent chuckings, the economical life of the chuck might be limited to two or three years. When chucks become badly worn, more time is required to chuck the work accurately, due to loose parts; when wear is due to inadequate lubrication, the friction loss becomes very great. If, as has been stated, the use of badly worn or inadequately lubricated chucks is accompanied by losses in output ranging from 10 to 50 per cent, the replacement of worn chucking equipment offers definite possibilities for many plants.

The advances in chuck design and construction



FRONT and rear view of an independent chuck that was considered good ten years ago. Compared with the modern design shown on the opposite page, the lighter construction of this chuck of an older period is apparent.

During the Past Ten Years

THE progress in machine tools, with the obsolescence of many designs considered highly productive ten years ago, is generally appreciated. Widely known also are the production possibilities of present-day cutting tools. But the same cannot be said of that important companion of both the machine and the small tool—the modern chuck.

In reviewing the improved features of present-day chucks, this article reveals the high status of the modern designs. It emphasizes the production losses arising from the use of chucks of an earlier period, as well as the waste resulting from negligence in replacing worn chucking equipment.

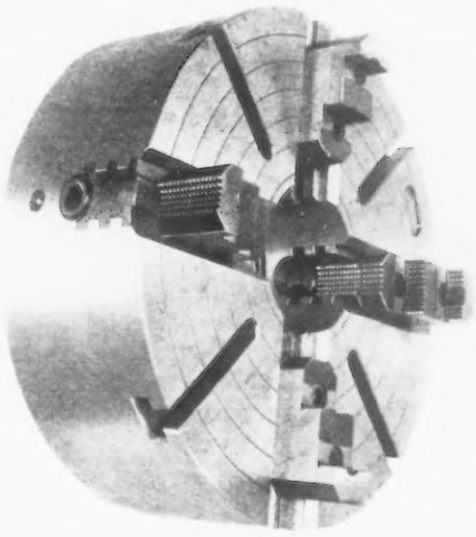
summarized above may be ...re thoroughly appreciated ... reviewing specific features of various types of ...cks.

The standard independent chuck, a chuck in which ...h jaw is operated without ...lation to the others, is the ...st adaptable for general ...op use in that it can be ...dily adjusted to hold odd ...es and shapes. It is especially useful for holding ...ork subjected to heavy ...ughing cuts. A good idea ... the advance in chucks of ...his type can be obtained ...rom the accompanying illustrations, which show, side ... side, the modern chuck ...nd the independent chuck ...considered good ten years ago.

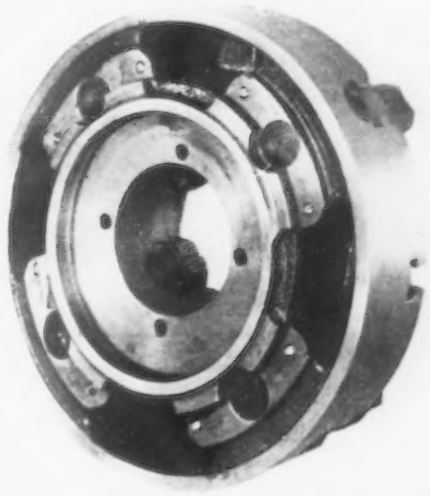
Needless to say, the massive chuck is the design ... today. Its steel body has comparatively great ...weight, but the strength of the chuck is not altogether in proportion to its weight. When gripping, ...he jaws of these chucks exert a tremendous leverage on the central portion of the body but very little ...on its periphery. Therefore, to avoid springing, and hence, bell-mouthing of the jaws, the great mass of the metal is needed at the center of the bodies. Observe how this is achieved in the modern chuck. Compare also the small light ribs of the older chuck with the large heavy ribs of the chuck of today. This "weakest part" is thus protected against breaking by the tremendous leverage.

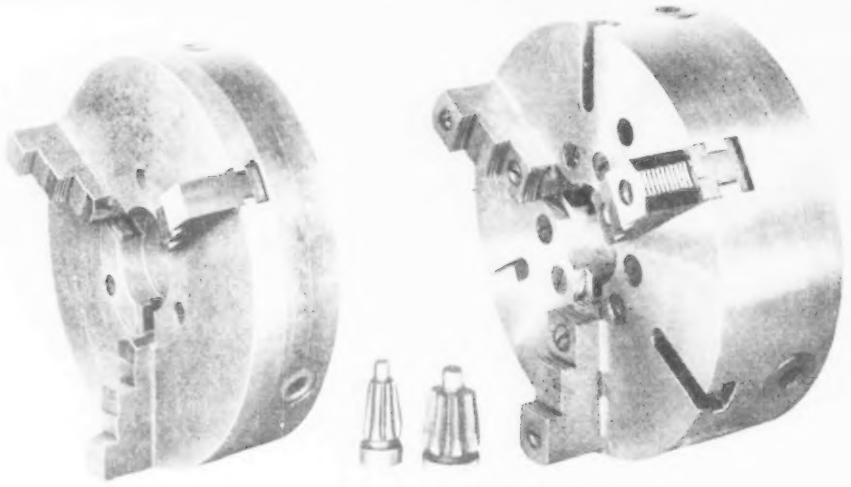
Then, the chrome-nickel jaw screws, electrically heat-treated so as to be hard on the surface and soft at the core, offer a marked contrast to the older soft screws of machinery steel. They are practically unbreakable. The diameter of the screw governs the thickness of the jaws and every unnecessary fraction of an inch in jaw width compels cutting away a corresponding amount of metal from the chuck body where it is needed. This consideration has resulted in a very careful balancing of parts.

The screw is threaded as nearly as possible from end to end, so that there will always be the greatest possible contact with the corresponding thread of



MASSIVE steel-body independent chuck of today. The mass of metal at the center of the body eliminates springing and bell-mouthing. This, with other features, adapts the modern design to the production requirements of today.



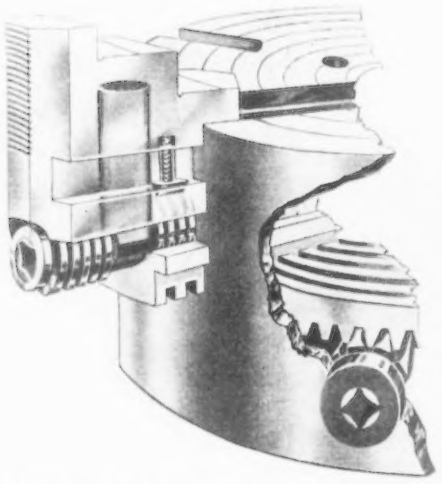


UNIVERSAL chucks of new and old design are shown side by side in view at left. Note the relative sizes of pinions used then and now.

THE hardened body of the drill chuck shown on opposite page prevents the battering and pinion hole wear shown on the old chuck at the extreme right. Ball bearings add to the strength and gripping power of the newer chucks.

the jaw. Experience has shown that a square thread with a coarse pitch gives the most satisfactory service. Although solid metal surrounds the screws, in contrast with the open construction of the older model, the new design is such that dirt and chips cannot lodge and remain in the screws and bearings. Dirt or chips that enter the chuck travel along the screws and pass out at the open ends. The jaws themselves are not only much larger but are made of special alloy steel hardened on all surfaces, including the threaded hole. In the past it was not customary to harden the jaws because operation of a soft screw in contact with a hard surface was not considered good practice. In the modern chuck, the hardened screw works in a hardened thrust bearing, increasing the effective life of the chuck fully 100 per cent.

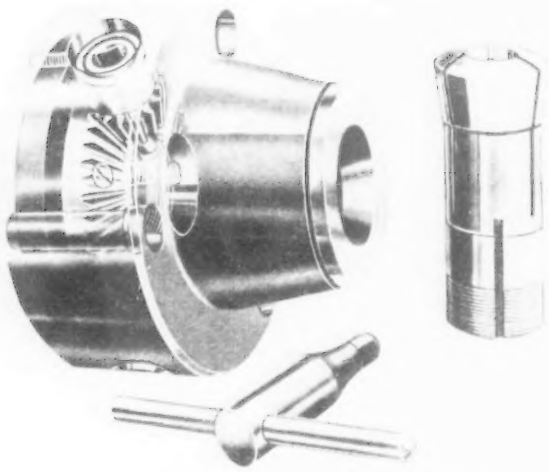
In the designing of the thrust bearings, the manufacturers have made a change for the better. The modern bearing, for example, as made to take the thrust both ways, is practically unbreakable, is self-alining, eliminates the weakening of the chuck body caused by coring out metal under the screw to form a recess and permits chips from the cutting tool to pass easily out of the chuck without clogging. Another notable advance is in the manner of finishing the jaw slots. The older method was to mill the slots, then file by hand, the assembly mechanic working on the high spots until he got the jaws in. But after three or four months in service, the high spots wore off and the jaws became loose and bell-mouthed. The jaw slots are now finished by grinding to maximum and minimum gages with a tolerance of only 0.001 in. between them. The result is that proper



Cut-away view of modern combination chuck.

alinement is secured, interchangeability is obtained, a free-moving fit produced and bell-mouthing prevented.

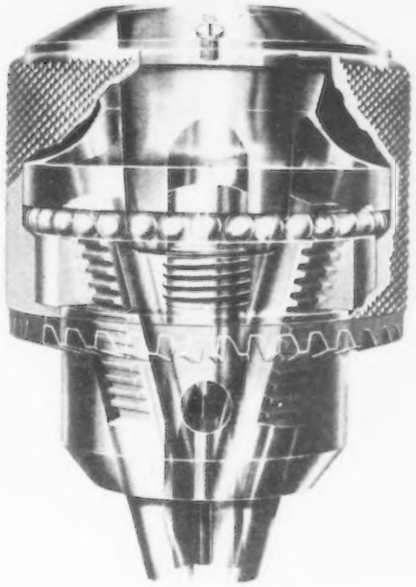
Likewise in the case of universal, or self-centering chucks, great advances have been made. The heavier and more rugged construction of the modern chuck as compared with its predecessor, in use ten years ago may be seen in the illustrations. Steel, in most instances, has replaced cast iron in all sizes up to 6 in., and in chucks larger than 6 in. steel bodies are obtainable. These chucks are now made so accurately that they can be depended upon to center work within 0.003 in. This accuracy is obtained by securing the exact alinement of the jaw teeth with the scroll threads through the use of automatic machinery especially built for the purpose.



The collet chuck enables use of collets of a capacity up to the size of hole in the machine spindle.

More Accurate Spiral Threads on Scroll Chucks

The almost perfect concentricity of scroll chucks is the result primarily of the accuracy with which



the spiral thread is cut on the actuating disk. The chuck builder of today has developed this feature to a point never conceived before. Also, he has further improved the design of the scroll plate as a whole, and in such a way that it will longer withstand the hard work it has to do. In addition, he has taken advantage of the selection of alloy steels now available and has greater knowledge of and facilities for heat treating. The scrolls and pinions are made larger and heavier to secure great strength and the heat treatment given them makes them both tough and reasonably hard. The relative sizes of the scrolls and pinions of the new and older chucks are apparent by a comparison of the pinions shown. So great is the care taken in securing accuracy that, by means of special automatic machinery, the teeth of the jaws are cut so that the lead does not vary more than a fraction of a thousandth of an inch. These modern chucks are about 50 per cent heavier than their predecessors of ten years ago, all parts are interchangeable and the pinions, jaws and screws are of special heat-treated alloy steel.

Combination Chucks Capable of Accurate Centering

The high development of the combination chuck, or a chuck provided with jaws that are independently adjustable and that may also be set as required for chucking round or irregular work, has long been known. This chuck has not been considered entirely satisfactory, however, owing to backlash in the jaws and difficulties in setting the jaws on a true center. By improved methods of manufacture, perfected during the past ten years, both of these defects have been overcome. Such chucks are now made that, without measuring instruments or testing, centering precision within 0.005 in. is assured. They are especially suitable for toolroom or other lathes on which many kinds of work must be done with frequent changes of set up.

Another development of the period is the collet chuck by means of which all the advantages of collet accuracy are extended to collet sizes up to the size of the hole in the lathe spindle. Previous to the advent of this chuck there was no way in which collets larger than about $1\frac{1}{4}$ in. could be used for rod work. These chucks are bolted to a form of lathe faceplate and made large enough to take collets varying from $\frac{1}{8}$ to $1\frac{3}{4}$ in. With them, chucking is effected by withdrawal of the collet, which encircles the work, back into the tapering wall of the chuck body. A disk with a threaded hole, having a beveled gear cut on one face, and which is turned through a pinion and key, is seated within the chuck. The collet is engaged by the

(Concluded on page 990)

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At far right are the jaws of a modern drill chuck; at the left, of a used chuck of the same size made some ten years ago. The increased pitch of the new jaw threads gives twice the speed of travel; and twice the gripping power is obtained. Better materials and more exacting heat treatments, as well as well-balanced design, underlie the higher efficiency of the modern drill chuck.

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Machining the 230-Ton Platen for Bethlehem's 14,000-Ton Press

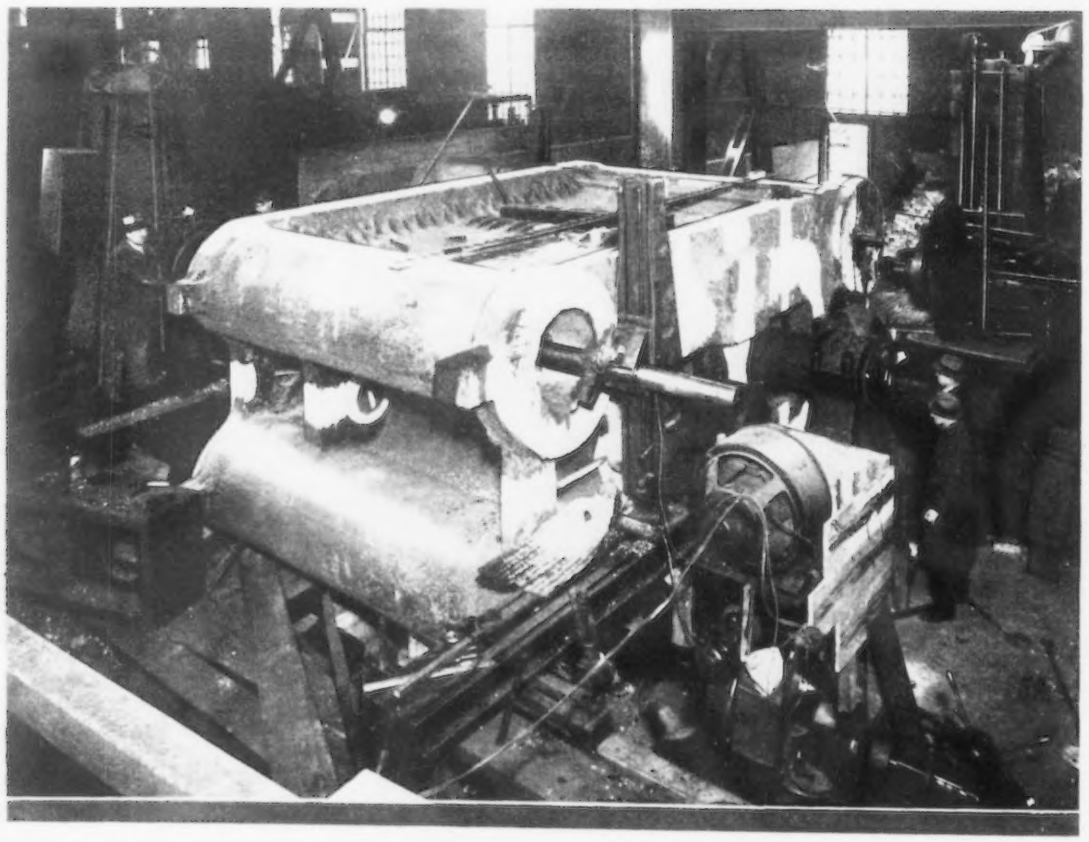
THE pattern making, molding, pouring, annealing and other steps in the production of the 460,000-lb. forging press platen, or cylinder jacket, recently completed at the Lehigh plant of the Bethlehem Steel Corpn., were noted briefly in THE IRON AGE of Feb. 19, page 636. In this article the machining operations are outlined.

Major machining operations on this unusually large steel casting include boring and facing of six large holes—four column and two cylinder. These holes were bored simultaneously, six machines being used. Those for the columns were machined to a diameter of 27½ in. and a length of 12 ft. 10 in., while the cylinder holes were finished to a diameter of 66.309 in. and to a length of 9 ft. 3 in. The center of the casting at the column holes was cored for clearance. Two roughing cuts and one finishing cut were required; the six holes were finished to a tolerance of 0.010 in.

Facing operations, for which special facing heads were mounted on the boring bars, comprised removing 1 in. of metal from the 51-in. diameter column-hole bosses at the top of the platen, and 1 in. of metal from the column-hole bosses at the bottom of the casting. Metal to a depth of 1 in. also had to be removed from the cylinder holes, which were faced to a diameter of 78½ in., for the cylinder flanges.

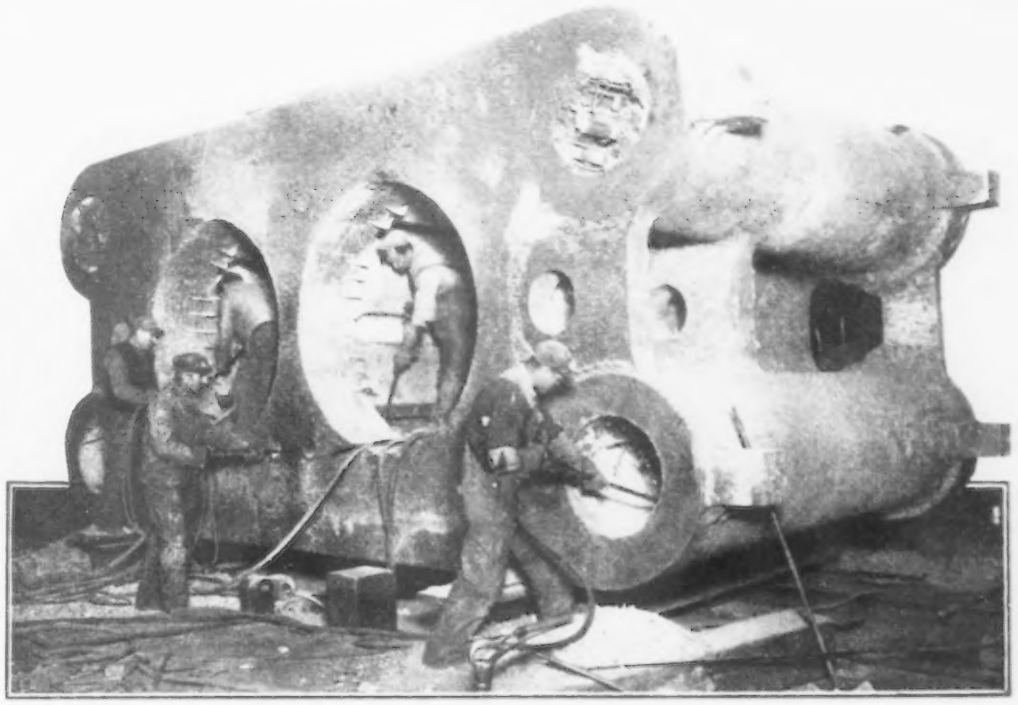
The general arrangement of the machining equipment may be seen in the illustrations. Two horizontal boring machines were used at the two column holes in the top of the platen and two Barrett bar machines for the two column holes at the bottom of the casting. For the cylinder holes, two worm-geared machines with chucks attached to the faceplates for holding the 21-in. boring bars were employed. Outboard bearings supported the outer ends of the boring bars of these machines.

The four machines for the column holes were equipped with 6-in. boring bars having 24-in. heads, while those for boring the cylinder holes were furnished with 21-in. diameter boring bars and 60-in. heads. The boring heads, of traveling-head type, were fed along the bar by a screw and a nut which had a star head attached to the end of the screw and fed as the bar revolved. Two 1 x 1-in. cutters were used in the column hole boring heads and three 2 x 2-in. cutters in the cylinder boring heads—all of high-speed



THE 230-ton annealed casting was mounted on a concrete foundation reinforced with H beams on which slotted floor plates were placed. Six boring machines were used, four for the column holes and two for the cylinder holes. Outboard bearings supported the ends of the boring bars.

THE machining of this huge steel casting was completed in two weeks. The setting up and laying out of the casting, setting up of the machinery, and the boring and facing of the four column and two cylinder holes are outlined in this article.



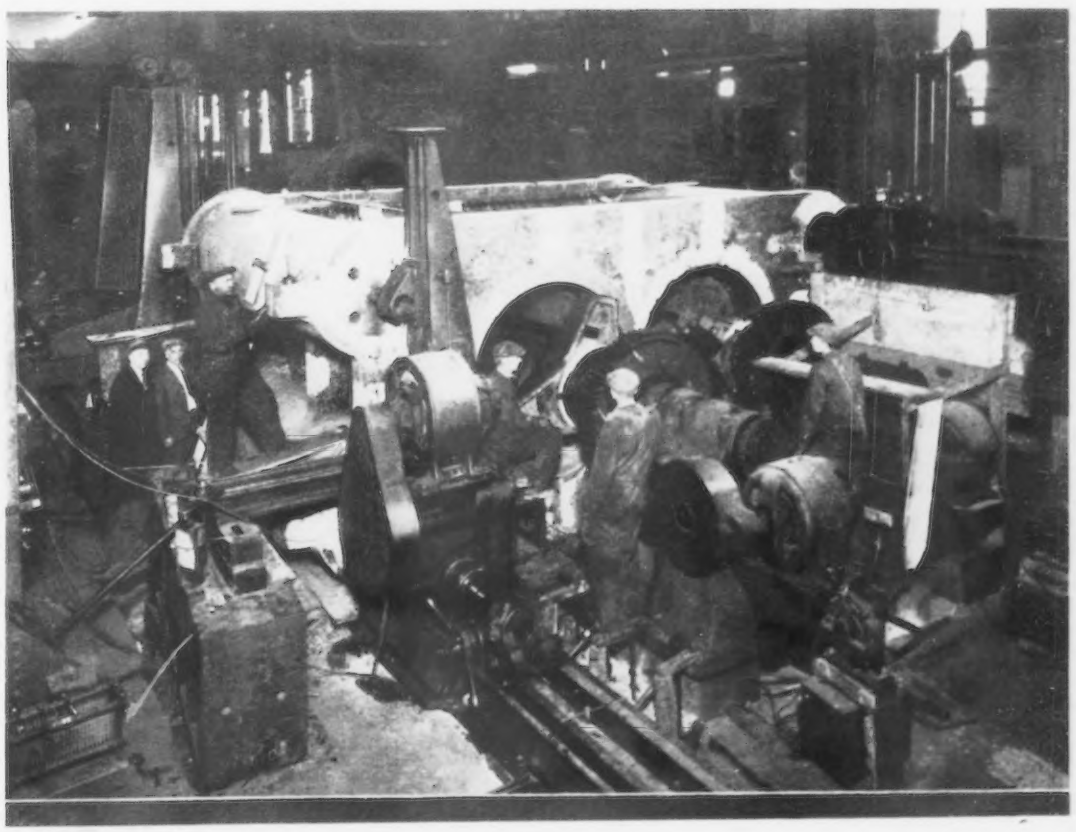
steel. All cutters were secured to the tool-heads by means of set-screws.

After the holes were finish-bored, and before facing operations were started, the bars were given extra support by mounting in bushings at each end of the column holes, an arrangement that assured maximum rigidity. The facing heads were held to the bars by means of keys. For facing the column-hole bosses, facing heads equipped with a cross-slide suitable for two roughing tools were used, thereby reducing the time required to remove the 4 in. of metal. This excess of metal, it should be stated, was due to the sink-heads required for pouring the casting. The cross-slide on the facing heads was fed by a screw and nut with star feed attachment.

The boring feed varied from 0.03 to 0.0625 in., while the depth of cut ranged from $\frac{1}{4}$ to $\frac{1}{2}$ in., running at 40 ft. per min. No coolant was used.

In addition to the column and cylinder holes, the two pull-back holes were bored and faced, and the

SPECIAL facing heads were mounted on the boring bars. Metal to a depth of 4 in. was removed from the column hole bosses at the top of the casting, and metal to a depth of 1 in. from the column hole bosses at the bottom, and at the cylinder holes.



casting was drilled at the cylinder holes; for the latter operation portable air drills were employed.

Layout Operations

For the machining operations, the annealed casting was mounted on a carefully prepared concrete foundation reinforced with H-beams on which were placed 6-in. thick slotted floor plates to assure parallelism and to facilitate the laying out of the casting and the clamping of the machines. In laying out it was necessary, of course, that the casting be level and plumb. This was checked in the following manner: Heavy piano wires were attached to 30-lb. weights, which were placed in containers filled with oil, to eliminate vibration, and fastened to all sides of the casting. The casting was then wedged at the proper places until it was plumb. The plumb bob was then dropped along the edges of the column holes to see how they would line up; it was found, on this large casting that these four holes were practically in alinement.

Sticks were then driven into the column and cylinder holes, and a center arrived at from the cored holes. After the six centers were scribed from the cores an average center was taken from the center of the casting. A straight edge was then placed across the top of the casting, squared and weighted on top, and two wires were dropped down each side with 70-lb. weights on each wire. These weights were also placed in oil. The wires were used to split the mean centers on each side, and a permanent center secured for all the holes.

After the permanent center was secured, a right angle was made from the straight edge on top of the casting to secure the lines for the width or height of castings. All measurements were made from this line for facing the column-hole bosses.

To secure a double check on the casting after the layout operation, the machines were placed in position and set up with this layout. The distance between the boring bars was then measured, which assured the proper center distances.

Special pin gages with micrometer attachment were used to assure accurate finish of the bored hole In gaging the distance between the column holes, ft. layout poles were employed.

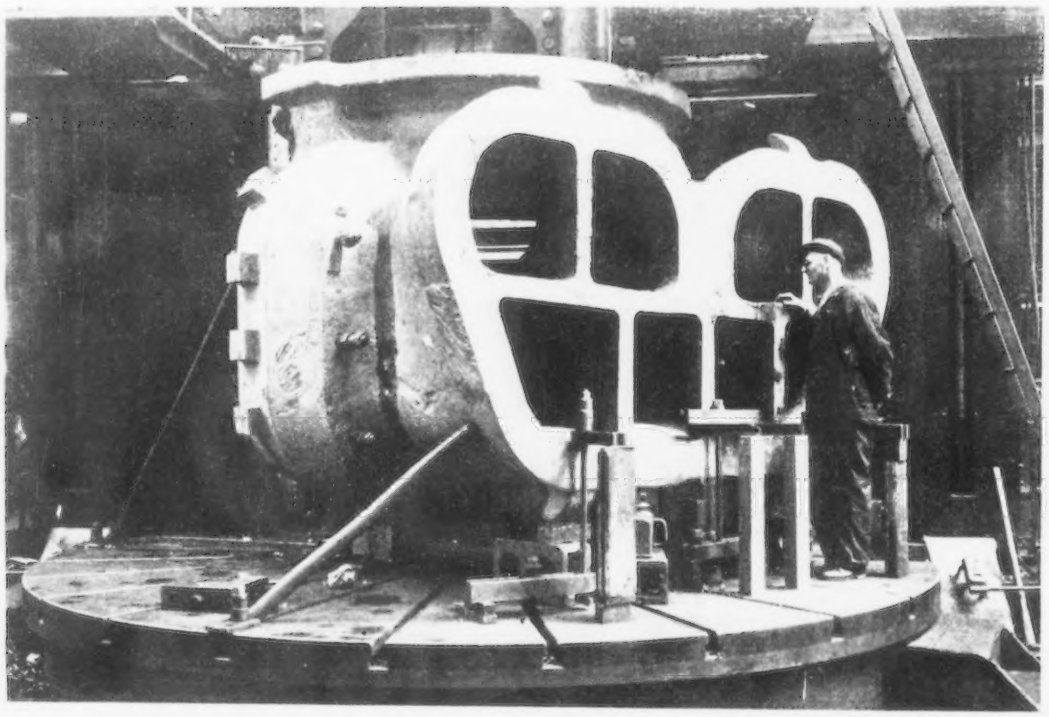
The machining of this 230-ton steel casting w completed in two weeks from the time it was receiv from the annealing furnace. This included setting-u laying out, setting-up of machinery, boring and faci the four column holes, the two cylinder holes, and t two pull-back cylinder holes and drilling. The 14,00 ton hydraulic press for which the platen illustrate was designed will be used in the production of heav commercial forgings.

Aluminum in German Transmission Lines

THE consumption of copper for high-tensio transmission lines in Germany has virtuall ceased, and aluminum, produced in Germany, is tak ing its place, according to *Metal Industry*, Londo Following very satisfactory experiences in Canad aluminum is now employed for 220,000-volt and th new 250,000-volt lines, and it is also intended to us it for the projected 330,000-volt line in southe Germany.

Aluminum is selected because it permits the us of a comparatively large conductor, which in turn reduces power losses resulting from corona, or the luminous discharge of energy into the atmosphere from high-voltage conductors. Even the slight in crease in diameter results in a large saving of elec tric energy. Besides this, the costs of aluminum cores (mainly 7 by 54 cores, or 5 by 70 cores, up to $1\frac{1}{4}$ in. diameter) are cheaper, as the weight is lower, which results also in lighter steel towers, and a further reduction of construction costs.

The substitution of copper by aluminum for this purpose will greatly reduce the consumption of copper in Germany and Switzerland (which is also substituting copper by aluminum for all transmission lines).



HIGH pressure casing for one of two 160,000 kw. tandem-compound steam turbine generators being manufactured at the Schenectady works of the General Electric Co. for the East River station of the Brooklyn Edison Co. These units will be connected to the largest 1,800 r.p.m. single generators.

Value of Uniform Accounting Methods Within an Industry

"COMPETITION is the life of trade." But all good adages are subject to qualification and it is now clear that competition, if unenlightened, is frequently the death of trade.

Prices must have a proper relation to costs in all activities carried on for a profit. The stability and security of a given industry depend in great degree on the establishment of and adherence to a uniform cost-finding system. Some of the essentials to the successful adoption of uniform accounting methods are outlined by the author.

By E. A. GROVER

A UNIFORM cost system in a trade association, to be effective, must be sold to the members and stay sold. To be sold, it is must be simple; to stay sold, it must be productive of profits.

Such a system should both stabilize sales prices and establish activity standards for an industry against which individual members may compare their own activities, thereby discovering weak places in their organization, thus reducing costs, which in the end produces profits.

Standard and normal costs are synonymous, whereas uniform costs indicate uniform methods of cost accounting. It will be understood that standard costs are what the product should cost with a plant at normal capacity, based on studies of several years' activity. The use of normal costs in establishing sales prices will bring more profitable business to each company by weeding out the unprofitable jobs and taking on those that will return a profit.

The best results from uniform costing by members of a trade association will be obtained by employing a full time cost man who will, with the help of the members, design a suitable system and secure its adoption by the member companies of the association.

Comprehensive Survey the First Step

The cost consultant should first make a comprehensive survey of the conditions in the industry by visiting the plants of the company members. Such a survey should disclose the cost activities most in need of improved accounting procedure, and plans should be developed to conduct a series of cost meetings to discuss the most effective way of treating them.

One of these cost meetings held every four months has been found to work out most satisfactorily and the presence of both chief and cost executives will yield best results. Meetings so organized will make unnecessary a cost committee, as the whole membership will contribute to the sum of information and experience from which the consultant will build the uniform system.

After each of the regional groups has had an opportunity to study and discuss a selected subject, the consultant should prepare a cost bulletin, setting forth the principles and procedure to be followed by the members in costing the activity discussed. Between the preparation and issuing of the cost bulletin and the planning for the next meeting he should make his regular calls on the member companies to discuss and clarify the subject treated.

Not only should the several specific activities of the association be discussed in the regional meetings, but semi-annual meetings should be held at some central point where all the members in the association may meet to consider such topics as the members may suggest.

Manual of Uniform Cost Methods Essential

As soon as sufficient material has been brought together by the regional cost conferences, the consultant should edit a manual of cost accounting for the uniform use of the members.

The placing of the manual in the hands of the members will by no means insure its adoption, and all the tact and skill of the consultant will be required, not only to induce lukewarm members to introduce the system in their organizations, but to assist those who do adopt it, in properly installing it.

The board of directors and manager of the association, all of whom should be familiar with the man-

*Excerpts from an address before the New York Chapter of the National Association of Cost Accountants.

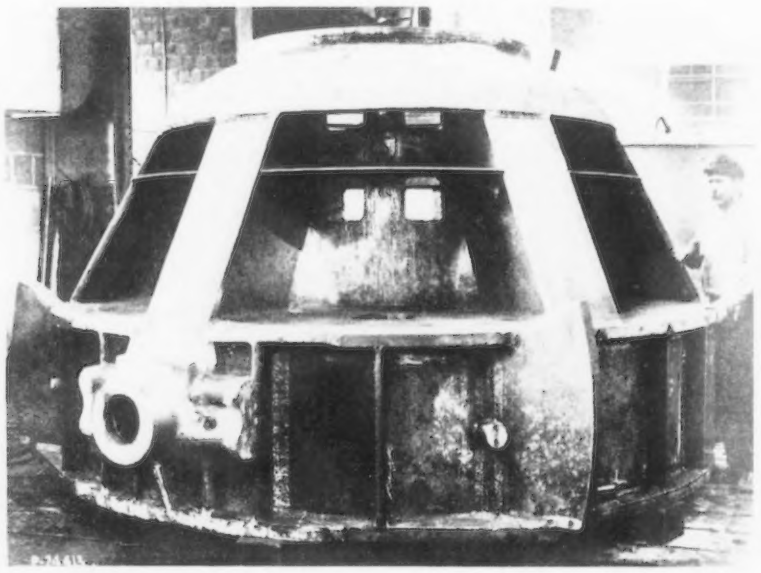
ual, can be of the greatest assistance in cooperating with the consultant in this most important and perhaps hardest part of the whole job. For, unless a majority of the members engage wholeheartedly in the task of installing and operating the system in their organizations, much of the time and effort represented in the months of preparation will be lost.

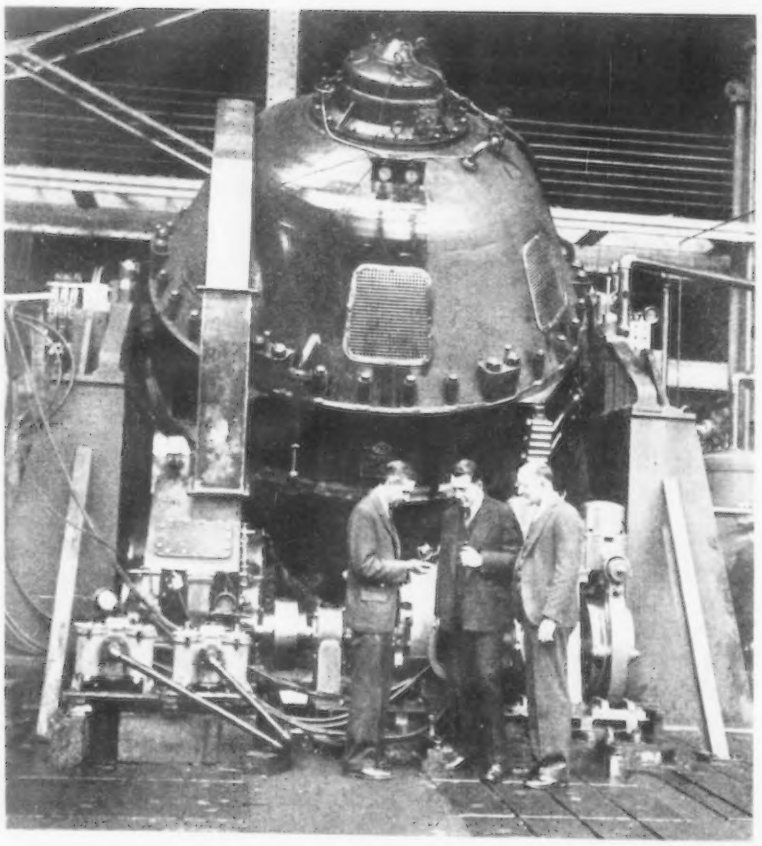
When the manual has been presented to the members and its general adoption practically assured, the consultant should begin to establish industry standards from reports submitted by those members who are using the uniform system, and who in turn will be supplied with these industry standards for comparison with their own activity records.

These standards, representing concrete evidences of the practical value of the applied system, to with the enthusiastic endorsement of members the manual, will go far toward spreading the of better costing procedure in the industry.

To make a uniform cost system worth while trade association, it is essential that the membe willing to cooperate with the association staff adoption and application of the procedures set in the manual. To secure this uniformity may discarding methods in themselves effective. Ye value to the individual member of comparing h tivity standards with others in the industry or the industry standard can only be secured if all agreed to follow a uniform procedure in impo details.

Electric Welding Used in Building of Gyroscope





AN 11-ft., 120-ton gyroscope, on which welded steel plates for the case have been used for the first time in such construction, has been completed for the Sperry Gyroscope Co., Brooklyn, at the South Philadelphia works of the Westinghouse Electric & Mfg. Co. The gyroscope is to be shipped to a foreign shipbuilder. Engineers claimed at the test of the gyroscope that it would keep a 450-ft. ship within 2 deg. maximum roll.

One of the illustrations shows the case of built-up steel sections, electrically welded, and the other shows the completed gyroscope after it had been inspected by Robert B. Lea, manager marine department, Sperry Gyroscope Co., Alexander Shein, Sperry company engineer, and J. G. Smeby, a Westinghouse engineer, who are standing in the foreground.

International Interchange of Machine Tools

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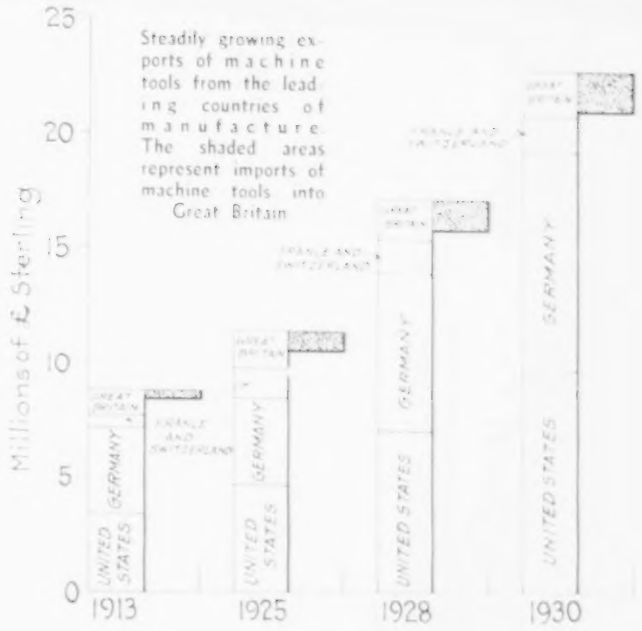


A SERIES of articles in *Engineering* (London) recently dealt with the international movements in various types of engineering products. Machinery of divers kinds has been covered in successive articles, the sixth instalment of which deals with machine tools.

Expressed in both tons and money value, the exports of machine tools from Great Britain, France, Germany and Switzerland are covered in a table here presented. The figures in value cover also the exports from the United States, but the tonnage movement is not shown for the United States, because our exports are not so reported.

Of perhaps greatest interest in the whole table is the fact that exports of machine tools for 1930 considerably exceeded those for 1929 in both tonnage and value, in spite of the poor business year generally experienced in 1930. Another point of interest lies in the fact that 1930 exports on the tonnage basis exceeded those of 1913 by about 39 per cent, whereas the value of the exports in 1930 was more than two and a half times that of 1913. This indicates that the unit value to the ton in the 17 intervening years has made a net advance of almost 100 per cent.

This latter item is indicated, furthermore, in tables published by our contemporary, but not here reproduced, showing the value per ton for British shipments year after year from 1913 to 1930. The increase was from £61.2 per ton of machinery exported in the earlier year to an average of about £133 last year. A similar increase is reported in the unit value of machine tools imported into Great Britain, which went up from £91.4 for 1913 to an average of about £155 in 1930.

The values of imports have been consistently higher on the tonnage basis than of exports, since the early part of 1923. This indicates that heavier and rougher machinery is exported from Great Britain than is imported.

Our diagram shows how closely the British imports of these "master tools of industry" are approaching British exports. In both 1929 and 1930 the value of tools imported came within 13 per cent of the exported tools.

INTERNATIONAL MOVEMENTS IN MACHINE TOOLS

(In Thousands of Pounds Sterling)

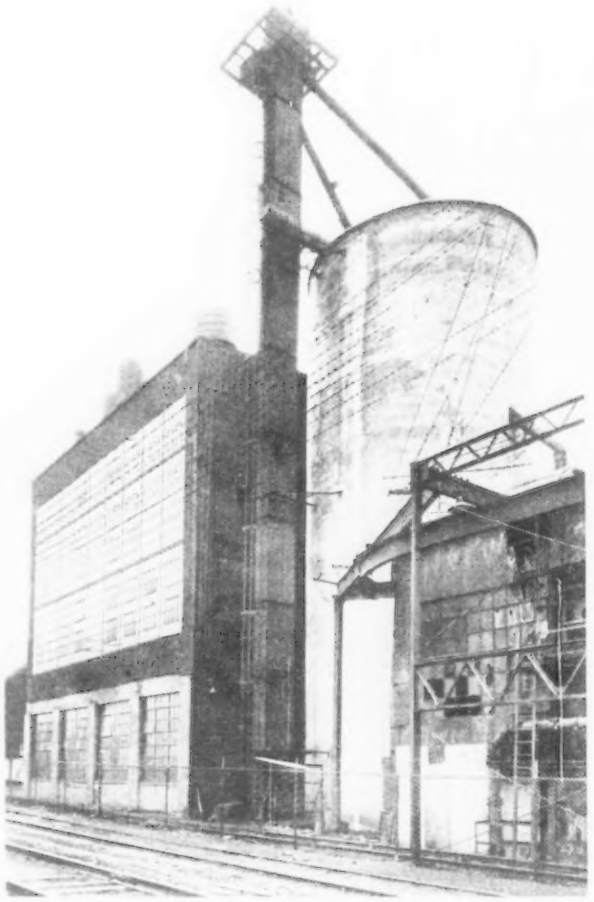
Exports from	1913	1924	1925	1926	1927	1928	1929	1930
Great Britain	1,013	1,362	1,561	1,532	1,615	1,770	2,156	1,856
France	372	663	792	659	763	793	933	900
Germany	4,004	2,769	3,816	4,590	5,689	6,937	8,919	9,700
Switzerland	97	488	486	403	490	650	772	700
United States	3,309	3,304	4,568	3,886	5,149	7,014	8,401	9,700
Five	8,795	8,586	11,223	11,070	13,706	17,173	21,201	22,856

(In Gross Tons)

Great Britain	16,539	11,995	14,291	13,572	14,535	14,554	16,339	13,915
France	4,511	8,515	11,163	11,413	10,024	10,164	11,202	9,500
Germany	73,164	33,502	44,471	59,686	62,178	70,552	86,795	105,000
Switzerland	964	2,808	2,852	1,673	2,219	3,070	3,456	3,000
Four	95,178	56,820	72,777	86,644	88,956	98,345	117,689	131,415

IMPORTS INTO GREAT BRITAIN

Gross Tons	3,744	2,889	5,103	7,626	7,539	8,490	10,692	10,686
Thousands of £	342	487	734	882	1,343	1,349	1,878	1,661
Unit Value, £	91.4	168.6	143.8	115.7	178.1	158.9	175.7	155.4



Cutting the "Steam Cost" of Forgings

By W. C. KAMMERER

IN forging plants using a large number of steam hammers and other steam driven equipment the cost of steam is to be considered as an important part of the production cost. This was the attitude of the Champion Machine & Forging Co. of Cleveland, and it resulted in the new installation described by Mr. Kammerer.

PRODUCTION costs in its drop forge plant have been reduced by the Champion Machine & Forging Co., Cleveland, by a marked saving in its fuel costs. This has been accomplished by the installation of a new boiler and auxiliary equipment, including a fuel economizer for the utilization of waste heat. The boiler house as now laid out, is designed to produce steam at the lowest possible cost.

The saving in cost has been effected by having efficient high grade boiler equipment and a stoker of a size and a boiler with a height of setting that permits the use of cheap high volatile low fusion coal. The boiler is of 1000 hp. capacity and can be operated at 300 per cent rating. It is stated that it is the largest single boiler used in a forge shop.

Another feature of the plant in the line of economies is the provision for coal storage. While a coal silo is rather common in coal yards the storage of coal in a silo by a manufacturing company is somewhat of a novelty.

The boiler is a standard water tube type built by the D. Connelly Boiler Co. It is fired by 10 retort, 25 tuyere rotary ash discharge Taylor stoker. Over the stoker hopper is a coal spreader which spreads the coal over the stoker hopper as it is delivered from the silo spout. A Foster-Wheeler economizer is located on the operating room floor between the boiler outlet and induced draft fan. The flue gases in passing through the economizer are dropped from 550 deg. F.-600 deg. F. to approximately 350 deg. F. and the heat is absorbed by the feed water, the temperature of which is raised 80 to 100 deg. in passing through the economizer.

Boiler Room Is Heated by Radiators

The bridge wall of the boiler is water cooled in order to effect economies in maintenance. The front and side walls are air cooled. The boiler is so well insulated that the boiler room instead of being overheated is provided with steam radiators on the first floor and basement in order to maintain comfortable room temperature in cold weather.

The boiler is provided with a Hagan Corporation combustion control system, Bailey boiler meter and a complete line of pressure and temperature gages.

Under the boiler is an Allen-Sherman-Hoff ash hopper from which ashes are dumped into a hand car. From this the ashes are discharged into a steam jet conveyor, which is a part of the old boiler room equipment. Later it is proposed to dump the ashes into a skip hoist which will carry them to an overhead storage bin.

In the old low set boilers which are still used to some extent, it is necessary to use low volatile West Virginia coal in order to comply with the Cleveland smoke ordinance. The new boiler is fired with Pittsburgh No. 8 $1\frac{1}{4}$-in. nut and slack coal. Under nor-

mal operating conditions it is stated that there is a fuel saving of 100 tons of coal per week when using the new boiler instead of the old ones, which means that the output of forgings is produced with that much less fuel. Also there is an additional saving due to the use of the lower grade of coal.

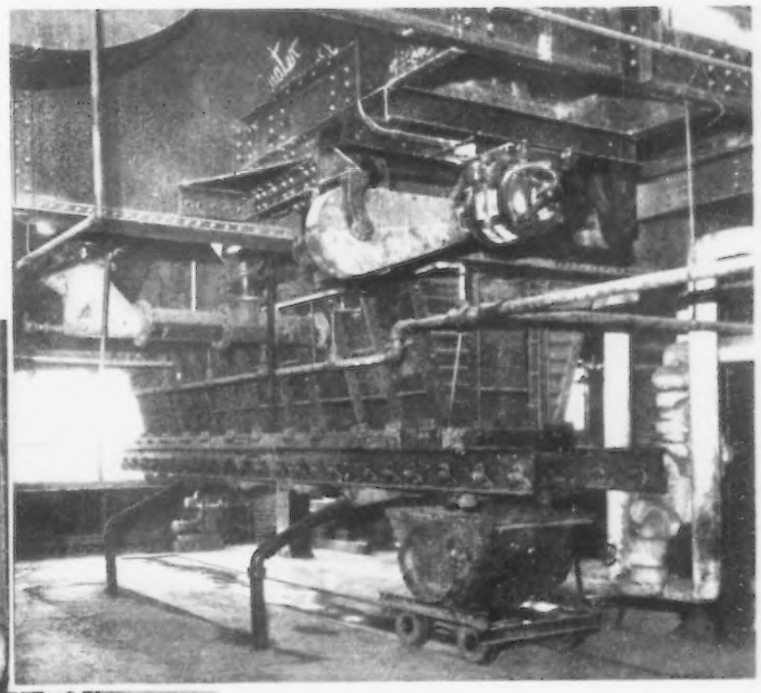
Coal Storage Is in Silo

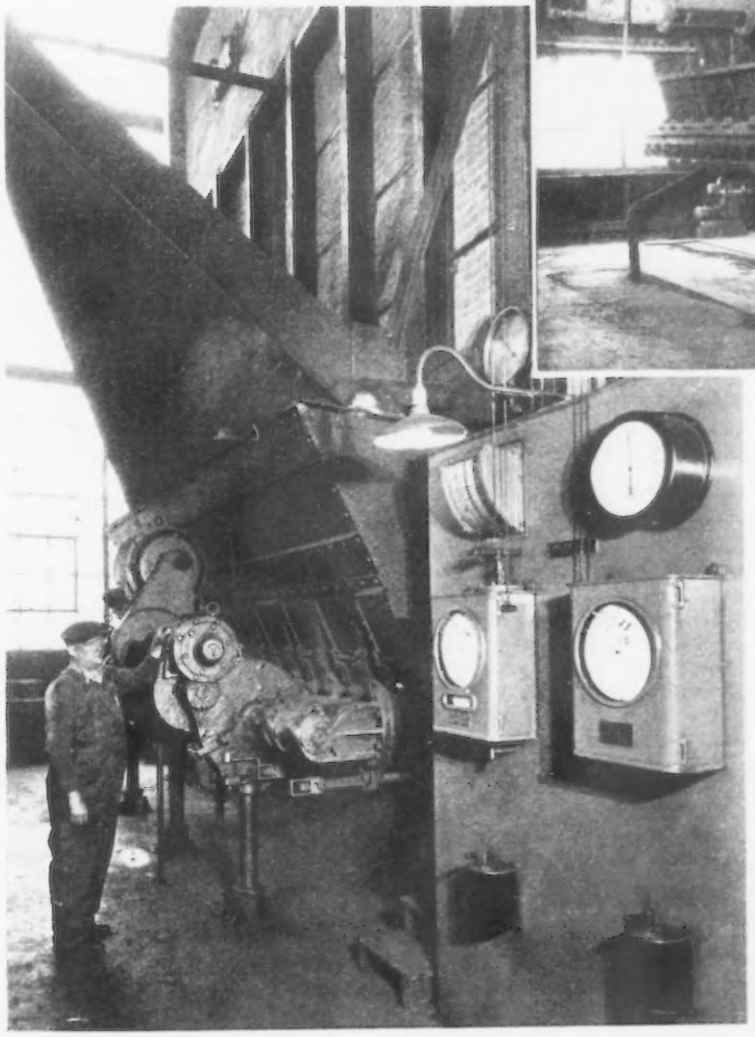
The silo is a cylindrical shaped coal bin 67 ft. high and 27 ft. in diameter and has a capacity of 950 tons. It is built of reinforced concrete with 6-in. wall thickness. A rather common coal handling method is followed in delivering coal to the silo. The fuel is dumped from hopper bottom cars into a hopper beneath the track and a reciprocating feeder carries it a few feet in a pit. It passes through a crusher or can be by-passed into a bucket elevator which carries it to the top of the silo at the rate of 35 tons per hour.

A reinforced concrete partition in the upper part of the silo, built at a 45 deg. angle, divides it into two bins. A vertical partition through the center divides the upper bin into two compartments, one for low volatile and the other for high volatile coal. The coal is delivered by gravity from the top of the elevator to the upper live coal storage bin through two chutes, one feeding into each compartment. A valve permits the delivery of the fuel into either compartments. When either side of the upper bin is filled the coal flows over the edge of the shelf into the lower part of the silo. As little of the low volatile coal is used there is seldom the possibility of much of this fuel overflowing into the lower bin and causing a mixture of the two grades.

How the Coal Is Delivered

A 15-in. diameter spout leads from the high volatile coal side of the upper coal bin to the new boiler. This made of 3 16-in. steel plate has a 45-deg. slope and the coal passes through it by gravity and is discharged onto the coal spreader over the stoker. Another 15-in. spout leads from the other half of the upper storage bin and this is divided into three branches through which the low volatile coal is delivered to the three old boilers. All spouts have under-cut gates operated from the boiler room floor





The bottom of the silo has a 45-deg. slope to the discharge spout so that there are no dead spots or pockets in the lower storage bin. There are also two emergency doors so located that coal may be taken from them by hand, one being at the ground level and the other at the operating floor level.

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FRONT view of new boiler. Coal is delivered from the silo by gravity to a spreader over the hopper of the stoker. Meters and gages are located on the control board at the right

MINIMIZING the handling of coal and ashes helps to reduce the steam cost. (Above) Gravity takes care of conveying the ashes as shown in this view of the basement under the boiler

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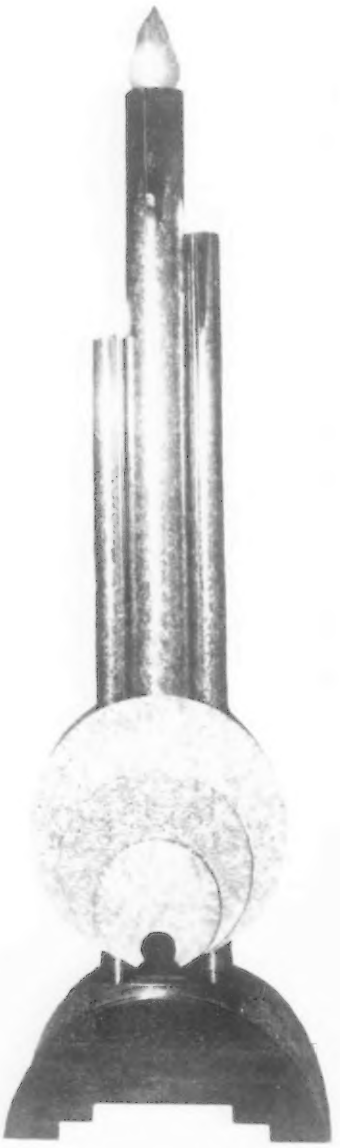

Plated Zinc Sheets Used Effectively in Modern Decoration

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INCREASING use of sheet metals for decorative purposes is bringing many plated finishes into the field of the metal worker. Recently, the American Nickeloid Co., Peru, Ill., developed attractive special finishes on chrome nickel, brass and copper-plated sheets. The various plating metals employed provide varying shades, which may be used by the metal worker in combination to obtain many unusual decorative effects. The illustration of a modern electric candlestick is an example of the use of the finishes in combination, chromium, brass and copper-plated sheets having been used effectively in the disks forming part of the base.

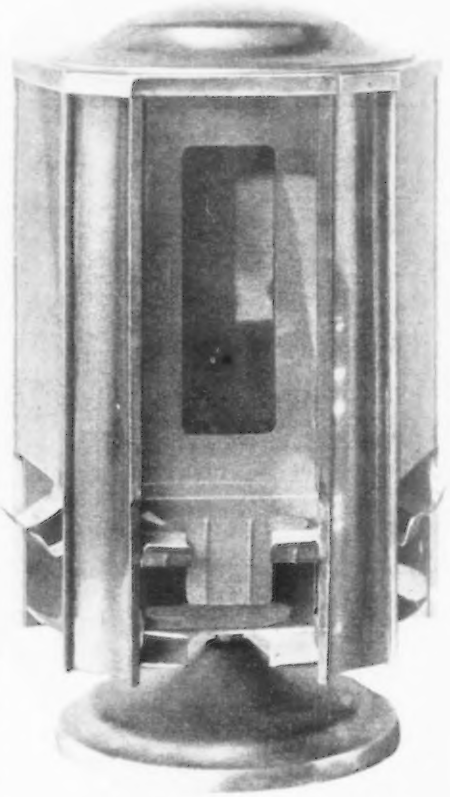
Most of the plated sheets are from 0.008 to 0.070 in. thick (Nos. 4 to 20 zinc gage). The brass-plated sheets have a gold luster, nickel-plated sheets with chromium finish have an appearance similar to platinum or chrome-nickel alloy steel, and the copper-plated sheets provide a reddish hue. In addition to plating on a zinc base, tin plate is used when a low-priced plated sheet is required. Most of the tin plate is 65-lb., but heavier weights are used, plating with brass, copper or chromium having been applied on tin plate up to 195-lb.

To provide a variation in texture and design as well as shade, a crystalline finish has been developed for the brass, copper and chromium-plated sheets, which is overlaid on the surface of the plated sheet, but gives the appearance of an etched design of modern motif. The chromium-plated zinc sheets are given a special satin finish, similar to the Tampico brush finish on chrome-nickel alloy steel. In fact, the maker suggests the satin-finished chromium-plated sheet for use in conjunction with chrome-nickel alloy steel for interior work. For such work, where moldings, panels and long strips are required, plated zinc 0.040 in. or heavier is usually specified. In small products, such as coverings on buttons or bolt heads, women's low-priced compacts and similar goods and for display fixtures and settings in department stores, plated sheets of 0.012 to 0.032 in. (Nos. 6 to 13 gage) are most adaptable.

The use of special methods of plating are claimed by the company to result in a complete bond of the nickel, brass, copper or chromium with the surface of the zinc sheet, permitting severe working without damage to the finish. Ordinary bending, double seaming and even a flat bend with or against the grain, are said to leave the plated surface unaffected.

While all the sheets may be satisfactorily soldered with a 50-50 solder and a flux containing no free acid, spot welding damages the high finish. In soldering the chromium-plated sheet, the chrome must first be removed from the spot to be soldered with a solution of three parts muriatic and one part sulphuric acid.

Plated sheets, especially the chromium finish, are used in restaurant-cafeterias and for interior work in department and other stores. While the chromium-plated zinc sheet has not the permanency of chrome-nickel alloy steel, which it closely resembles when given a satin finish, it is resistant to all corrosion for a long period and has been successfully used in products and decorative effects where cost of the raw material is a factor to be considered. Combination of the various finishes of sheets has provided striking fixtures and settings for displays in department stores.



This vending machine is fabricated of Nos. 10 and 13 gage chromium-plated zinc sheets, satin finished.

Composition, Performance and Heat Treatment of Super-High-Speed Steels

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NEW super-high-speed steels were discussed recently by Owen K. Parmiter, metallurgical engineer, Firth-Sterling Steel Co., McKeesport, Pa., before the Hartford, Conn., chapter of the American Society for Steel Treating. Anticipating a splendid treatment of the subject, 58 members and 16 visitors, representing most of the important manufacturing companies of the district, attended.

After tracing the development in composition of high-speed steel from its introduction by Taylor and White in 1898 to the present time, Mr. Parmiter gave the following comparison in composition between modern high-speed steel and super-high-speed steel:

Modern high-speed:
C 0.65 to 0.80; Si 0.20; Mo 0.25; W 17 to 22.
Cr 4 to 5.50; Va 0.75 to 2 per cent.

Super high-speed:
C 0.75 to 0.90; Si 0.20; Mo 0.25; W 17 to 22.
Cr 4.50 to 6; Va 1 to 2.50; Mo 0.75 to 1.50; Co 8 to 15 per cent.

To obtain the greater red hardness of cobalt high-speed steel, to which its superiority is due, it is necessary to use higher hardening temperatures than those required by ordinary high-speed steel. The greater red hardness is attributed to the fact that cobalt is not a carbide-forming element and hence it concentrates the carbides in a matrix of cobalt-iron.

How to Heat Treat These Steels

The temperatures recommended for super-high-speed steels are:

	Deg. Fahr.	Brinell
Forging	1650 to 2100	
Annealing	1600 to 1700	250 to 300
First preheat	1200 to 1300	
Second preheat	1700 to 1800	
Hardening	2425 to 2500	650
Draw	1050 to 1150	625 to 675

Annealing is best done in mica or lime dust. If annealed in the forge, the steel should be covered with hot coals and allowed to cool. When the tool will permit deep grinding after hardening, the heating should be done slowly to 1500 deg. Fahr., not over; then as quickly as possible raised to 2425 to 2500 deg. Fahr. Large tools require the two preheat treatments given above.

If quenched in oil, the tool should be quenched until black and then drawn back immediately. If quenched in molten salt, the bath should be at 1050 deg. Fahr. and the tool should be left in the bath 30 min. The draw back after salt bath quenching requires one hour at temperature. For shock resistance the best draw back range is 650 to 700 deg. Fahr. For greatest red hardness 1050 deg. Fahr. is best.

SUPER-HIGH-SPEED steels are those which contain cobalt. To obtain greater red hardness, higher hardening temperatures are necessary than for ordinary high-speed steels.

In designing tools, less rake is required for tungsten carbide or super-high-speed steels than for ordinary high-speed steel.

Tools made of super-high-speed steel should be as large as those of regular high-speed steel. Light feeds are to be preferred.

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To protect the surface of the high-speed tools in hardening, four methods are available. The Hayes furnace, which provides a gas curtain in front of the door, is very good. When equipped with globar heating elements, it can be used continuously at 2500 deg. Fahr. and intermittently at 2700 deg. Fahr. This furnace has separate chambers for mixing the gas and air.

Protective coatings applied to the tools, such as borax or adamant cement, are quite practical for ordinary shop tools. Separate containers, made of nickel, nichrome, or of silicon carbide, are satisfactory for small parts. The diamond block of silicon carbide is limited to temperatures of 2300 deg. Fahr. and under, because higher temperatures cause the tools to take up carbon which lowers their melting point. The fourth method, the use of a fused salt bath for heating, is very good for hardening fine-edge tools. This method is limited to temperatures up to 2275 deg. Fahr.

Good hardening can be ruined by improper grinding. Lighter cuts, slower speeds and softer wheels are necessary for high-speed tools. Wet grinding at a speed of 1700 surface feet is recommended. Dry grinding causes a soft skin.

In designing tools, less rake is required for tungsten carbide or super-high-speed steel than for ordinary high-speed steel. Instead of 30 deg. for the drill point angles, it is possible to use angles as small as 15 deg. The edge is blunted to give an acute cutting angle. Such drills have been successfully used on manganese steel rails.

Some Records of Performance

Tools made of super-high-speed steel should be as large as those made of regular high-speed. Light feeds are preferable and for best results the machine must be rigid. The following performance records were given:

In turning cast iron pressure filter heads, super high-speed tools were used at 240 surface feet whereas ordinary high-speed tools could be used at 120 surface feet.

In cutting cast steel drum gears at 95 surface feet, super-high-speed gave three pieces per grind of the tool against 35 surface feet and one piece for ordinary high-speed. The same feeds and depth of cut were used in both cases.

In turning chrome molybdenum rolls, 11½ in. diameter x 4 in. long, super high-speed gave an average tool life of 6 hr. against one for the 18-4-1 high-speed. This represented an increase in production of 50 per cent.

Data Brought Out by Discussion

Some points brought out by the discussion were:

Super-high-speed steel is being hardened in Hayes furnaces without producing a soft skin. Some concerns can obtain this result with the same consistency obtained in other hard heat-treating operations.

Sweating at high temperatures has a lot to do with producing a soft skin; 18-4-1 high-speed steel scales at high temperatures, but cobalt high-speed steel does not scale as readily. The decarburized area of the former scales off, whereas the latter does not.

Cobalt does not form carbides but causes a concentration of carbides surrounded by a cobalt-rich matrix. The efficiency of cobalt increases in proportion to the percentage of cobalt in the steel, but other elements, especi-

ally carbon, help to increase the efficiency. The limit of the cobalt content is determined by cost and forgeability.

Diamond blocks covered with nickel plates should prevent the tools from picking up carbon at temperatures over 2400 deg. Fahr., but, due to the formation of CO, this experiment will not allow much higher temperatures to be used.

The hardening temperature should be reached as nearly as possible from the preheat temperature and no time should be allowed for saturation.

Using gas—preferably coal gas—the best results are obtained. Regarding flame, the best oxy-gas mixture temperature with neutral flame. A draft hood of sufficient size will give greater confidence than one of limited size.

The hardness number necessary depends entirely on the requirements of some high-speed steel tools which render them more liable to forging than others.

A high-carbon, high-chrome steel makes a better reamer for brass than either high-speed or super-high-speed.

As a welded tip, super-high-speed steel is being used for drilling gun barrels, but it is not as tough as 18-4-1 high-speed steel, due to the higher alloys.

Molybdenum is used in super-high-speed because the carbides of molybdenum are intensely hard.

The best hardness range for tools of super-high-speed is Rockwell C 65 to 67.

When using super-high-speed steel it is usually advisable not to reduce the number of teeth in a milling cutter, because of the increased impact on the teeth if they are too widely spaced.

The chairman, Henry Fishbeck, called a halt to the discussion at this point to enable the speaker to get some rest and an enthusiastic vote of thanks was given the speaker and also to the technical chairman, D. A. Nemser, for his excellent work in conducting the discussion.

Electric Welding Used Exclusively in Steel Work of New Factory

WHEN the need of larger facilities made it necessary for the Wilson Welder & Metals Co., Inc., North Bergen, N. J., to build a new plant, the company not only took the opportunity of building a scientifically laid-out factory, from the standpoint of production, but also of erecting a structural steel job in which electric welding was used exclusively. All welding was done in accordance with American Welding Society specifications.

Columns and beams were fabricated by arc welding in the structural steel shop, and transported to the factory site, where the cross-beams were electrically welded to the uprights. Our view, taken in the structural steel shop, shows some of the beams being fabricated. In the foreground is a load of lintels for door openings.

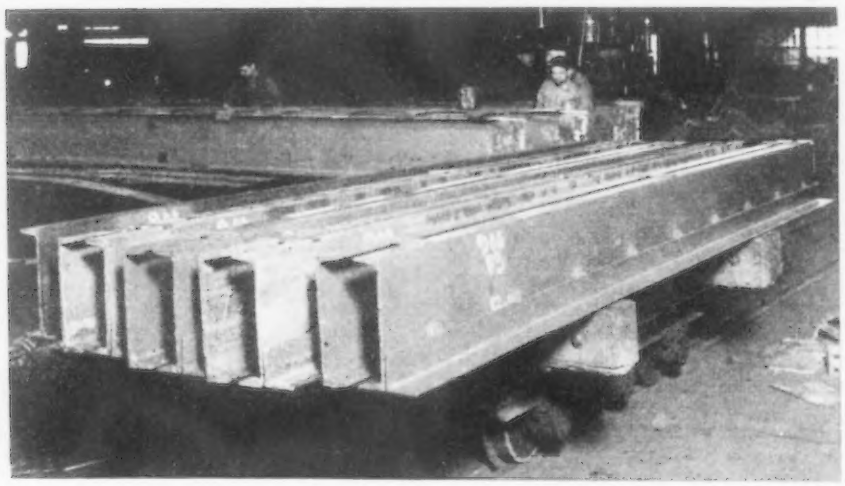
Electric welding effected a considerable saving in the tonnage of structural steel used and in the cost of both fabricating and erecting, and resulted in much stronger and neater joints. The following data show what was done:

Tons of structural steel	74
Inches of 5/8-in. fillet shop welding	4,180
Inches of 5/8-in. fillet field welding	1,030
Total welding wire, lb.	165
Pounds welding wire per ton steel	2.23
Feet of fillet welds per ton steel	5.86
Steel saved by welding, per cent	10

Kind of wire—Wilson "Colortipt," grade No. 17

Kind of machine—One-arc Wilson model "S" type, 200 amp.

In addition to the structural work the boiler and tanks and the track and supporting hangers for the portable crane monorails were arc-welded. This saved considerably in the weight of steel used and in the cost of installation. All work benches, bins and racks were also arc-welded.



Fabrication, by arc welding, of structural steel for new one-story factory. Lintels for doorways are in foreground.

Convention of National Metal Trades Association

The National Metal Trades Association will hold its thirty-third annual convention at the Hotel Sinton, Cincinnati, April 15 and 16. The most important subjects to be discussed will be stabilization of employment; unemployment insurance, public and private; employee training and supervisory development; industrial research; the economics of depression and what the machine has done to the wage worker.

The principal speakers will include Glenn Bowers, director of research, Industrial Relations Counselors, Inc., New York; James D. Craig, chief actuary, Metropolitan Life Insurance Co., New York; M. B. Folsom, assistant to the chairman, Eastman Kodak Co., Rochester, N. Y.; Magnus W. Alexander, president, National Industrial Conference Board, New York; Harold S. Falk, vice-president and works manager, Falk Corpn., Milwaukee, and Franklyn Hobbs, director of research, Central Trust Co. of Illinois, Chicago. C. F. Kettering, in charge of development and experimental work for the General Motors Corpn., is expected to give the banquet address.

The convention proper will be preceded by a two-day business session of branch secretaries.

New Standards Data

A new compilation of data entitled, "Measurement Units and Standards," has been issued by the American Institute of Weights and Measures, 33 Rector Street, New York, and a copy of this book may be obtained gratis by applying to the institute, William E. Bullock, secretary. In addition to the data on units and standards, the book contains an article recommending "timex" and "spacex" as names for the Einstein specialization of basic time and space. It also contains a useful description of the difference between a *unit* and a *standard*, prompted by the lack of unanimity existing in reference publications.

Shipments of electrical industrial trucks and tractors in January totaled 38 units against 51 in December, according to reports received by the Bureau of the Census from 10 leading manufacturers.

900-Ton Press, Rack Driven from Electric Motor

IN the new wrought iron plant of the A. M. Byers Co., at Economy, Pa., one of the innovations in mill equipment is the large press utilized to squeeze the plastic wrought iron into ingots for the blooming mill. Built by the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., this press is one of the largest single assembled pieces of machinery ever produced. It was built entirely to specifications for an operation not heretofore encountered in industry, and weighs, complete, about 800 tons. It takes the place of the old rotary, puddled mill squeezer used in making wrought iron by the hand process.

The press is set upon a concrete foundation over a pit 18 ft. deep, and the foot of the base casting or frame is 8½ ft. below the floor line of the plant. Total outside length of the machine is 49 ft., its width 38 ft., and its height 18 ft. Steel castings form the principal parts, the largest piece weighing 60 tons, while others range down to 15 tons in weight. The shafts transmitting motion to the movable parts are of steel, and the journal boxes of hard bronze.

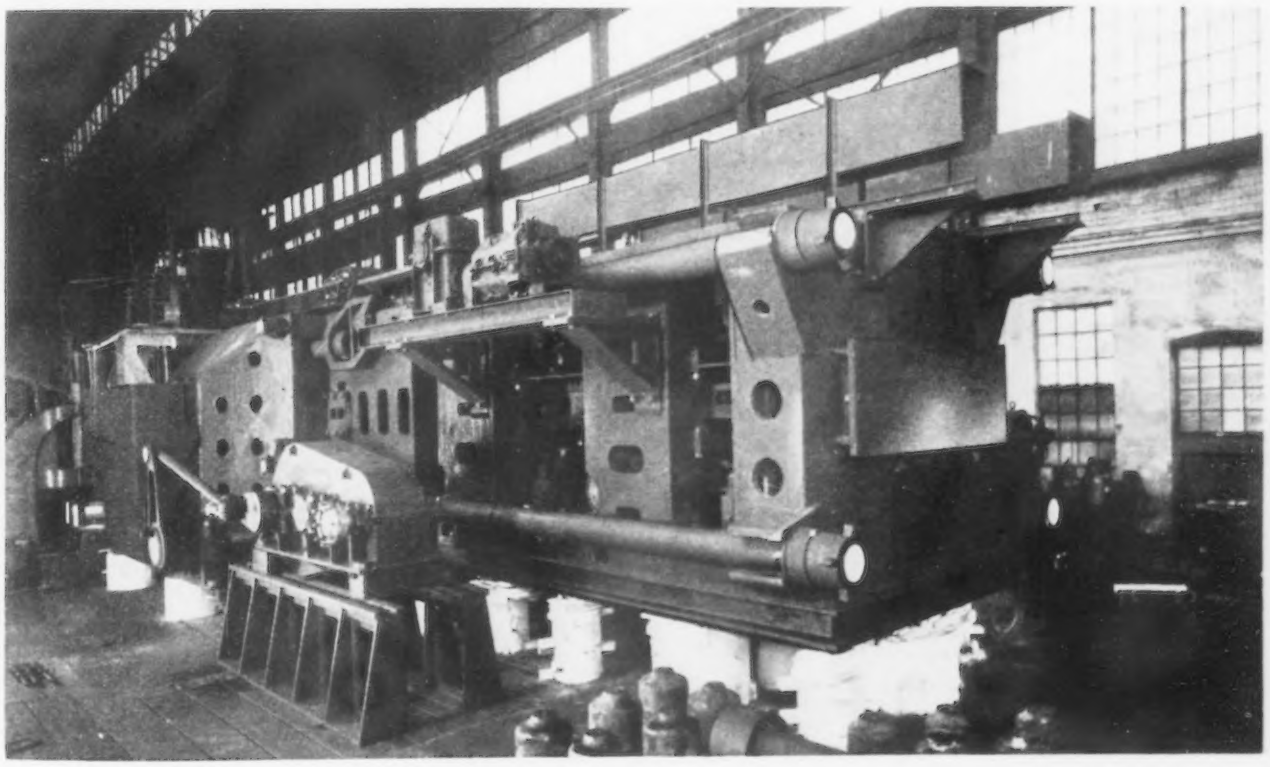
Rams Actuated by Electric Power

In operation the white hot ball of iron, at welding heat, and weighing more than 6000 lb., is dumped into the squeezing chamber of the press from a hot-metal ladle, as was shown in an illustration on page 1084, THE IRON AGE, Oct. 16, 1930. The chamber is 8 x 8 x 8 ft. in size. The metal is pushed forward in a longitudinal direction by the main ram of the machine, which is driven by 1200-hp. electric motor. The ram is carried forward to do its work of compression by two double-faced racks and eight pinions made of steel with cut gear teeth. The same mechanism produces the back travel of the ram after release. The main ram exerts a pressure of 900 tons upon the ball, crushing it to the required thickness. Two other rams then advance, one from either side, each driven by a 325-hp. motor, and exert a pressure of 100 tons upon the ball in the other directions, giving it the desired size endwise.

Steel manipulating fingers, driven by cranks and levers, propelled by 65-hp. motors, turn the lump over, after which the main ram again comes up and gives a final squeeze. The resultant from this pressing action is an ingot 16 in. x 24 in. x 66 in. in size. A lifting plateau, or platform, which forms the bottom of the press chamber, carries the ingot up and out of the press chamber by a crank-and-lever motion and transfers it to the blooming mill table. A 140-hp. electric motor furnishes the power for this operation.

After the ingot leaves the press chamber, the main ram is back at the starting point, in readiness to attack the next big ball which, in the interim, has been supplied to it and placed upon the platform. The rams do their work simultaneously, thus keeping the propulsion or operation

(*Concluded on page 992*)



Assembly of the 900-ton press, weighing 800 tons, before shipment. Six electric motors, varying from 65 to 1200 hp., actuate its several motions.

PICTORIAL PRESENTATION

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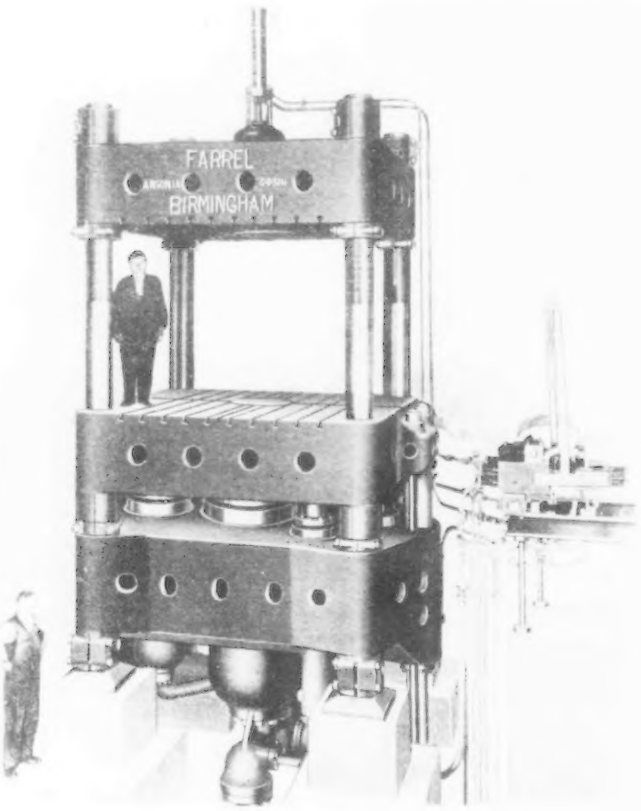


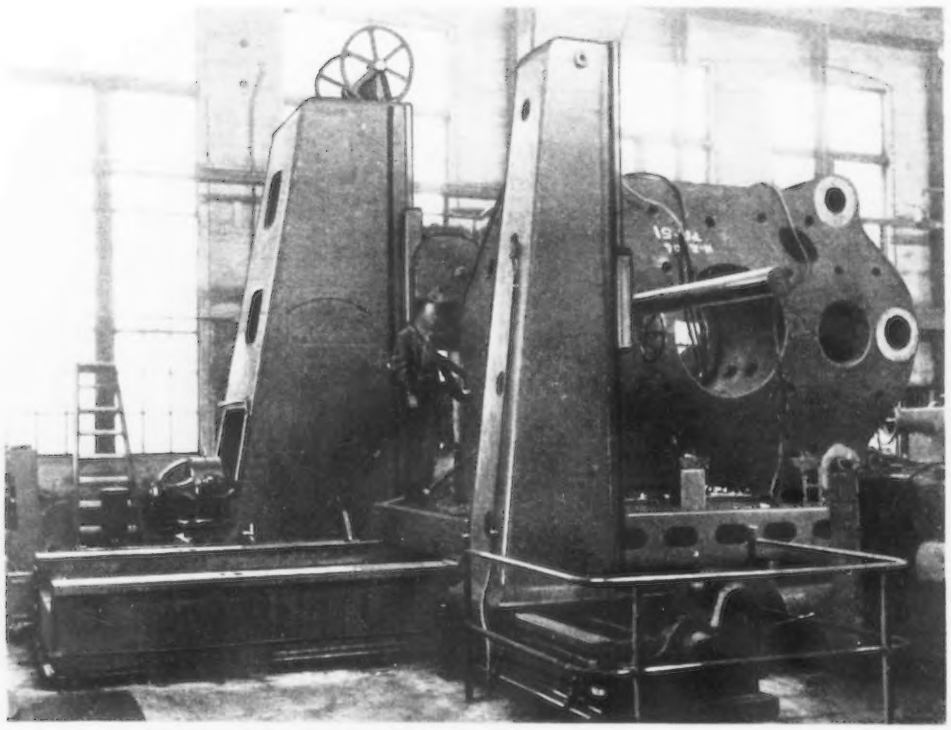
THIS 1500-ton forming and flanging press, bu by the Farrel-Birmingham Co., Ansonia, Con will be used by the Westinghouse Electric & Man facturing Co. for hot forming the ends of circu breakers, oil switches, etc., in the tank departme at East Pittsburgh.

The press is equipped with a 34 in. diameter ma ram, capable of a pressure of 1000 tons, and tw auxiliary rams which provide 250 tons each. The may be used separately or in combination, providi a triple capacity machine of 500, 1000 or 1500 ton pressure. The two auxiliary rams may be used f clamping, in which case the main ram works throu the guides on the moving platen.

The clear space on the platen between tie rods 97 in. by 85 in., maximum opening between movi platen and top platen is 72 in. and maximum ra stroke is 48 in. The floor space required is 13 f 3 in. by 9 ft., 6 in. Height above floor is 13 ft., 8 in., and distance below floor 20 ft., 11½ in.

A 250-ton knock out cylinder is provided, the ram of which works through the top platen. Auxiliary lifting rams are also provided for bringing the mov ing platen and main ram into working position quickly, by prefilling the main cylinders with water from the surge tank. Two hydraulic operating valves are used for this purpose. Return strokes are hydraulically actuated to increase the speed of operation.

Control and operating valves are of standard construction; spindles and seats are of Nitralloy steel and safety devices are provided to prevent damage in operation.



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Triple capacity hydraulic press for forming and flanging heavy metal parts (above).

Crosshead in position for boring main and auxiliary cylinders (at left).

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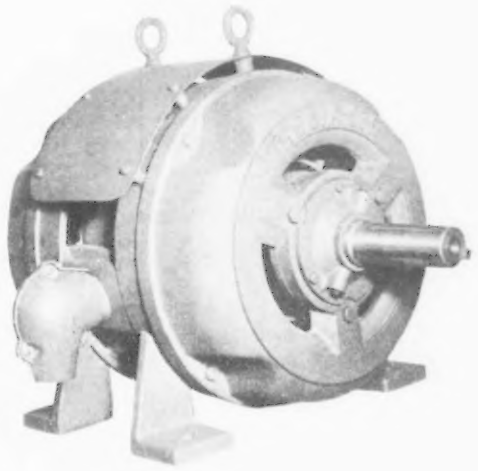
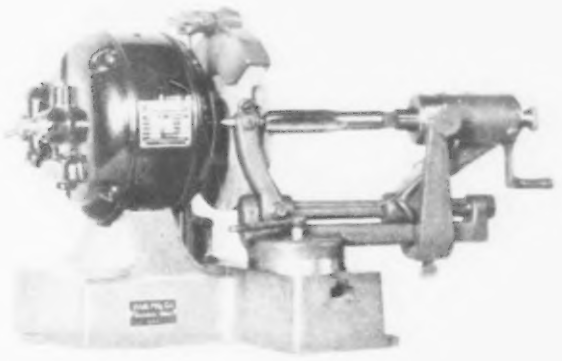
OF NEW METAL-WORKING EQUIPMENT

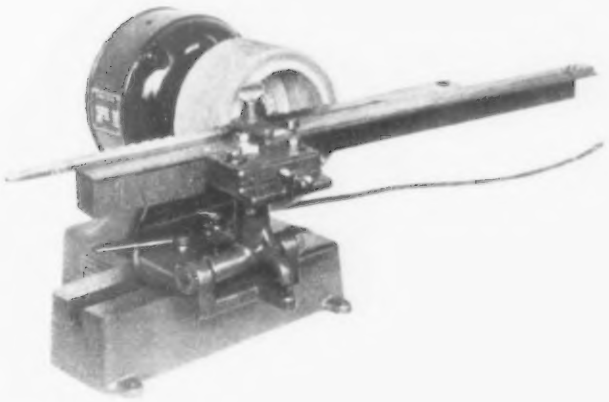
RELIANCE ELECTRIC & ENGINEERING CO., Cleveland, have developed heavy-gauge sheet steel drip covers applicable to their direct current and alternating current motors. These are bolted to the motor frames in roof-like fashion, and protect those in bad locations from dripping water, acid or injurious solutions. (Below).





THIS tap sharpener is a new product of Wells Manufacturing Co., Greenfield, Mass. It sharpens hand taps from ¼ to 1 in. diameter, and pipe taps from ⅛ to 2 in. Machine screw taps as small as No. 6 can be handled by using a special chuck. Standard machine takes tools up to 7 in. long. It is also capable of grinding reamers of any length. (Above).

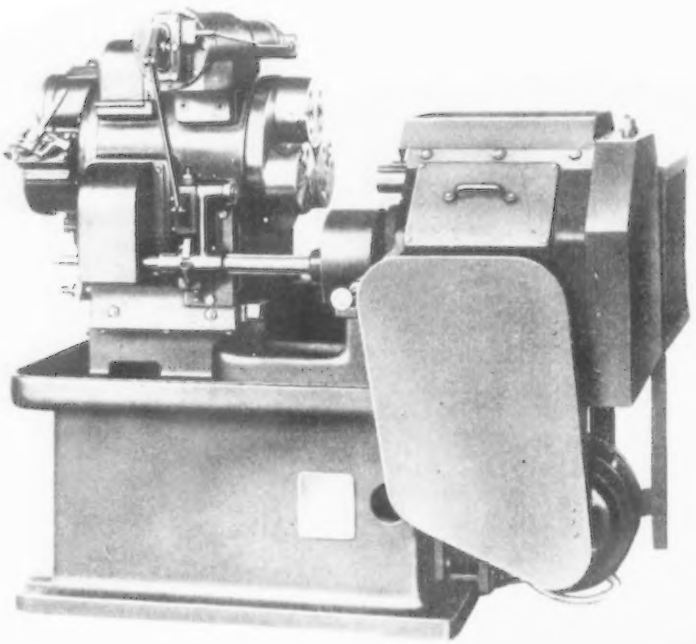
WELLS MANUFACTURING CO., Greenfield, Mass., has added this No. 110 sharpener for keyseaters to its line. It sharpens the face of the tooth, giving any desired undercut, will grind alternate teeth in chip-breaker fashion and is fed by hand. All motions are swinging, and the machine has no slides. The motor is ¾ hp.



THIS four-wheel drive, skid-handling electric elevating truck is a new product of Terminal Engineering Co., New York. It is small enough to enter box cars, yet will carry a load of 3000 lbs. in overhung position. The overhung design enables skids to be tiered without the use of a helper. Speed is 10 miles per hr. light and 7 to 9 miles loaded.

Announces Two-Spindle Automatic Chucking Machine

THE Goss & DeLeeuw Machine Co., New Britain, Conn., has placed on the market a two-spindle automatic machine for comparatively simple chucking jobs. This unit, which is similar in principle to the company's four-spindle chuckling machine, will perform combinations of boring, facing, turning, drilling, reaming and threading operations. Although intended primarily for jobs requiring both plain machining and threading, the machine is adapted also for two combination operations of plain machining.



WIDE range and facilities for quick change over from one set-up to another are features. The motor guard in rear view below is mounted on wheels

Two horizontal spindles revolve the cutting tools. Opposite them on a faceplate are three work-holding chucks, two of them presenting the work to the tools, and the third, in the upper position, for unloading and loading. Indexing the faceplate carries the work successively from the loading position to the first spindle at the rear, then to the second spindle in front, and finally back to the loading position. Thus two machining operations are being performed simultaneously and loading is done without loss of time. The finished piece can be ejected automatically from the air chuck between the second and loading positions, and the operator has only to place the rough piece in the open chuck and trip the closing valve.

All three mechanisms for indexing, feeding and withdrawing the tools, and starting, reversing and stopping the threading spindle, are automatic; furthermore they are mechanically interlocked and cannot operate except in proper sequence.

Wide range, both as to type and size of work, is a feature of the machine. Seven inches between chuck centers, together with wide clearance while indexing, permits handling of large and irregular-shaped pieces. Production cycles ranging from 180 to 1200 per hour are obtainable with the standard sets of feed pick-off gears. Spindle speeds range from 100 to 1000 r.p.m., for either threading or plain machining. The spindles are large and are ball-bearing mounted. The threading spindle is driven and reversed by the company's standard independent reversing motor unit. With this drive small tapping jobs can be handled at rates up to 20 pieces a minute; at the same time power is available to pull a 1¼-in. taper pipe tap in brass or iron.

Provision for quick change-over from one set-up to another is another feature, the time required averaging about one-half hour. The feed ra and individual spindle speeds are a justed by quick-change pick-off gea The cam is seldom changed, altho only 10 min. is required to ma a change. Depth of cut is co trolled by means of a microme screw; the depth of thread is adj able to a fraction of a turn.

All threading tools are control by positive lead-screws in consta engagement with their lead nuts. T machine may be readily arranged cut two threads of different pitch and diameters simultaneously in same spindle. The threading-spin reversing-motor drive unit operat through worm and worm wheel a pick-off gears. Starting, reversin and stopping are accomplished by automatically controlled switch wh the machine is in operation, but ca be controlled by a convenient han switch while setting up. No clutche are used, and reversing shock is eliminated by the cushioning effect of the electric motor.

Each spindle is carried in its indi vidual slide, and the feed for the rear or plain machining spindle, is fur nished by a hardened steel solid-track cam. The feed is transmitted to the slide which carries the spindle, and the spindle does not, therefore, feed out of its bearings.

Three air chucks are standard equipment. They are built on the G. & De L. patented design with round jaws and bore, rather than the usual "T" or "H" shaped jaw and slot. Hand-operated chucks designed on the same principle are optional equipment. The jaws are operated by a wedge attached to the end of a draw bar which extends back to the air cylinder at the rear of the turret. A double piston of two diameters with the line air pressure constantly maintained between the two pistons does away with stuffing boxes. The valve

(*Concluded on page* 974)

Herringbone Gear Teeth Accurately Planed by Rack Cutters

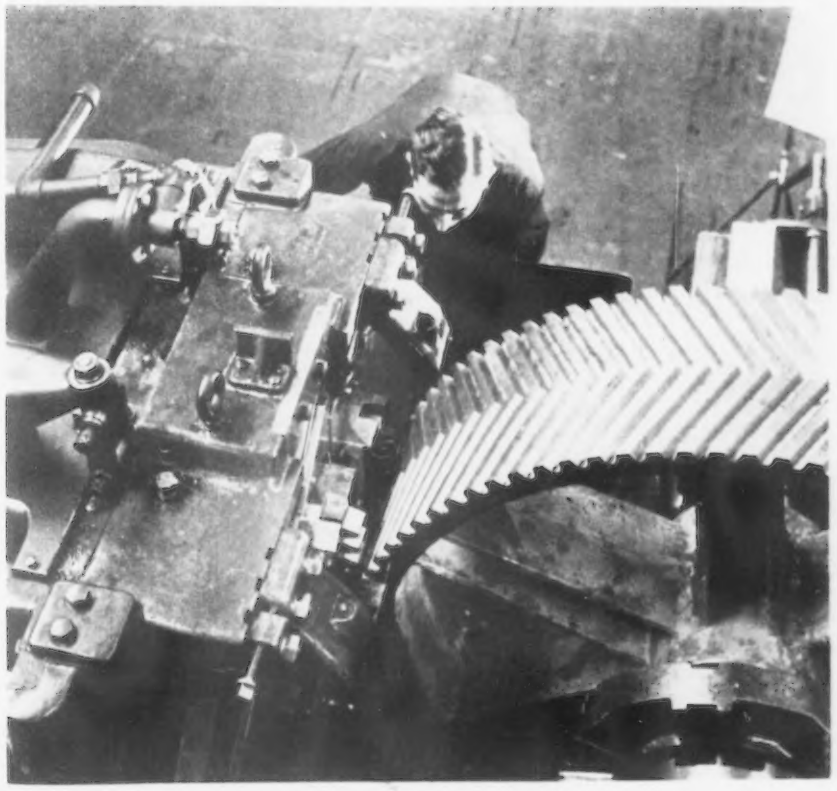
DEVELOPMENT of a line of single-type herringbone and double-type herringbone-Maag gear speed reducers by the W. A. Jones Foundry & Machine Co., Chicago, has led to an interesting use of gear planers that generate as they plane and that use cutters with rack-shaped teeth. The actual cutting is performed by what is in reality a piece of rack made into a cutter, and during the process this cutter and the wheel it cuts are rolled together, as a rack and pinion roll together.

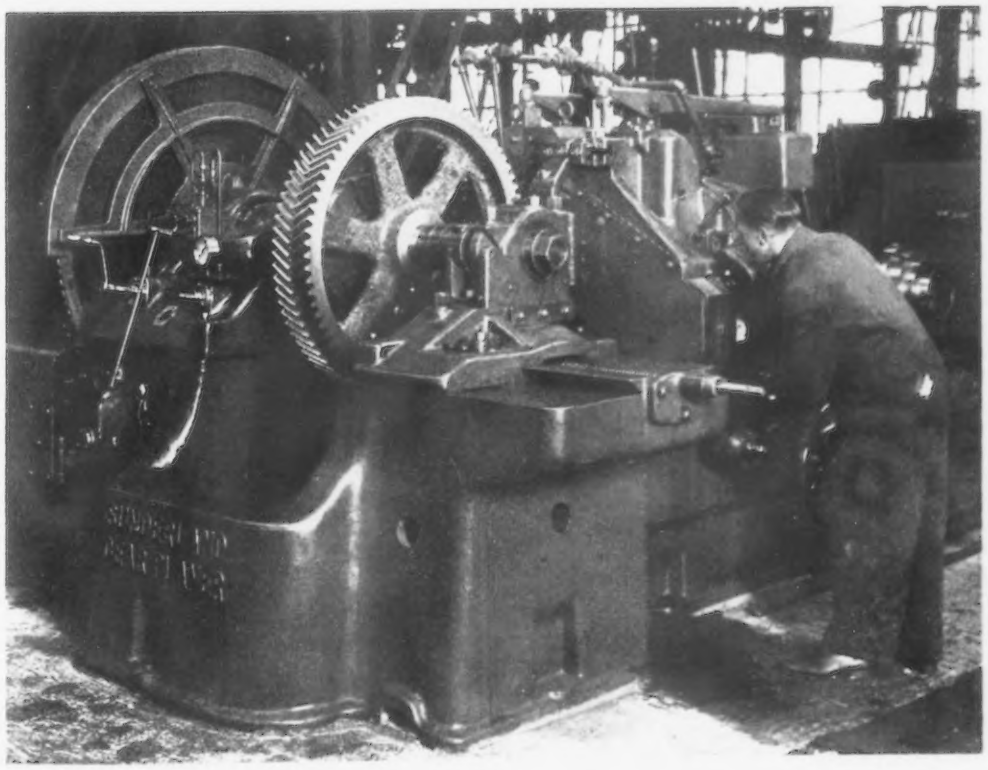
Before going into detail as to practical operations of cutting herringbone gears, it might be well to mention that the two types of speed reducers mentioned herein are supplemental to spur gear and worm gear speed reducers, also manufactured by the Jones company. The herringbone speed reducer finds application where a moderate ratio of reduction is required, where quietness is a governing factor and where it is essential to transmit power at equal angular velocities with smooth, even torque free from vibration or pulsations.

All of the herringbone, as well as the Maag, gears are generated by means of rack-shaped cutters that follow closely the theory of the involute tooth, which is based on a rack having teeth with straight sides. During the time the rack cutter is planing the wheel to produce teeth and spaces, the gear blank is rotated and rolled along the rack tool. The machines on which these gears are cut are built by J. Parkinson & Son, Shipley, England, and they are known as Sunderland gear planers.

Process of Cutting Spur Gears

When cutting spur gears, the cutter receives a reciprocating motion across the face of the blank, parallel with the axis of the wheel, and so cuts away the metal between the teeth of the wheel, forming the spaces and leaving the teeth, the cutter being gradually fed to the desired depth of tooth, after which the depth remains constant. At the same time as this is taking place in successive strokes, the blank is receiving a rotary motion and the rack or cutter is traversed at a tangent in a vertical direction, the motion of the blank and rack being





THIS gear planer generates double helical gears to sharp apices. About 4 hr. is required to finish the 48 in. diameter, 8 in. face 96 tooth herring-bone gear shown. The cutters have rack shape teeth which are inclined at the angle of spiral to be cut

geared to act in unison on their respective pitch lines.

This relative motion, comparable to the rolling of a rack and pinion together, brings fresh parts of blank and rack into contact and causes the teeth of the cutter to generate gear teeth of the correct form to gear perfectly with a rack having the same shape as the cutter. This concerted motion of blank and cutter may be regarded as a rolling motion, which is taking place at the same time as the cutting stroke of the rack; given a sufficient number of teeth in the rack, it would require only a little more than one revolution of the blank to complete the gear, without any attempt to index or divide for number of teeth. Such a long rack, however, would not be practicable, and, therefore, the machine is arranged to index automatically after the rolling motion has operated for a distance of one or more pitches. The indexing really consists in causing the rack to "step back" one or more teeth on the blank, when the rolling motion again commences.

Therefore, while the cutter, during its cutting stroke, is in contact with several teeth at the same time, and with a different part of each tooth, it planes only a comparatively narrow strip on each tooth at each stroke, and a different part of each tooth is submitted to the action of the cutter at the next stroke. All the teeth of the blank in turn are shaped in exactly the same way by the same teeth of the cutter, so that uniformity in the shape of the teeth is obtained, and all standard gears that are cut by the same cutter will gear correctly with one another.

Different Cutter Head for Herringbone Gears

When it is desired to cut herringbone gears, the spur gear cutter head, which has a horizontal motion, is removed from the machine and a head is substituted with cutter slides which operate at the angle of spiral which is a fixed figure for a given cutter slide head. The cutters have rack-shaped teeth, which are inclined at the angle of spiral to be cut. They are corrected after hardening by grinding to correct shape and pitch; being of simple form, they are easily sharpened without alteration of shape. If the cutters are kept and sharpened in pairs, as is recommended, it is only necessary to place them in the cutter holders against their seatings, and tighten the clamping screws, no further adjustments being required. The cutters are used in pairs, one of each hand of spiral, and move alternately from the edge to the center of the face of the blank, at a tangent to the angle of spiral, each cutter clearing the way for the other when cutting "continuous" teeth.

Each cutter slide is driven by a solid forged, heat-treated crankshaft, the shafts being geared together so that they are timed to move the slides and bring each cutter alternately to the central plane of the wheel. As the right-hand cutter advances from the edge to the center of the wheel face, the left-hand cutter recedes, and vice versa. In this way, each cutter cuts the clearance for the other, and though it may appear that the cutters at the end of the stroke must cut into the solid metal, in practice this is not the case. It is, however, with a view to prevent "spring" or yield at this point that the fewest possible parts have been used to drive the cutter slides, and that these are made as unyielding as possible.

At the same time as the actual cutting is being done, the wheel is rotating and the cutters are also moving at a tangent to the pitch circle of the wheel, and at the same speed, so that the teeth and spaces are generated to correct forms, the mechanism by which these movements are obtained being exactly the same as in the gear planers for spur and spiral gears.

The wheel to be cut is mounted on a horizontal spindle with outer support. A rim stay is provided for preventing side displacement or springing of the gears being cut and for resisting the pressure exerted by the cutters. The lubricant provided for the cutters also lubricates the bearing surfaces between the rim stay and the gear blank.

The specific machine used on this work has a capacity of 84-in. diameter, 15-in. face and 1½ diametral pitch. It has two fixed lengths of stroke, so that the full stroke may not be used for narrow gear blanks. A double-acting cutter box may be used for cutting spur gears more rapidly. It carries two cutters, a roughing cutter and a finishing cutter, clamped back to back.

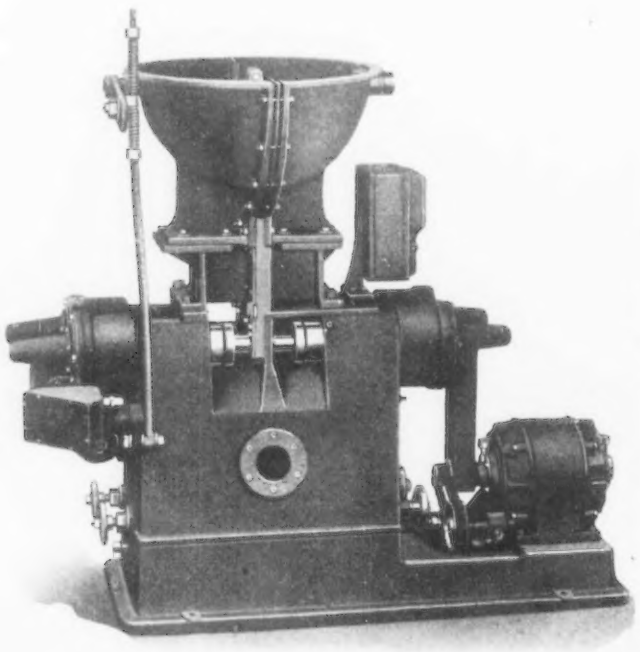
Duplex Nut Countersinking Machine

FOR automatically countersinking both ends of the hole in nuts ranging from ½ to 1 in. in diameter, the Kent Machine Co., Cuyahoga Falls, Ohio, has brought out a new duplex machine.

One hopper feeds both sets of countersinking spindles. On each side of the machine are two opposed rotating and reciprocating spindles which carry the countersinking tools. Provision is made for adjusting the stock to give the depth of countersink desired, irrespective of the thickness of the nut, a feature emphasized as assuring the same amount of countersinking on every nut.

From the hopper the nut to be countersunk passes through the magazine chute to a formed receptacle, in which it is held while being countersunk. After the countersinking operation the nut is ejected automatically from the holding receptacle and a new nut is fed into place. The spindles and working parts are controlled by one cam shaft, located in the center of the machine, between the countersinking spindles.

Changes to accommodate different sizes of nuts within the capacity of the machine may be made quickly. Each set of countersinking spindles makes 60 reciprocations a minute, giving a production of 7200 nuts an hour. The machine is furnished for motor drive, a 1-hp., 1800-r.p.m. motor operating through belt drive to the center camshaft of the machine. Countersinking spindles are driven direct from this shaft. Lubrication is by a force feed system.



THE one hopper feeds both countersinking spindles, each of which reciprocates 60 times a minute, finishing 7200 nuts an hour.

Will Pig Iron Have "Secondary" Bottom?

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

BOTH pig iron production and steel ingot production have now increased more than seasonally for two months in succession. In February, pig iron production according to our estimates was 62.3 per cent of "normal." This compares with 57 per cent last December, and with 31 per cent at the 1921 bottom (July). Steel ingot production is 61.2 per cent of normal, against 52 per cent in December and 33 per cent in July, 1921.

As bearing on demand, we note that unfilled orders of the Steel Corporation decreased sharply in February to 86.5 per cent of the average for 1923-1927, the lowest for any February since 1927, and lower than in February, 1922. The seasonal probability is that unfilled orders will remain about unchanged in March or increase slightly. This is the first decline in our February index since 1927.

Sales of finished steel probably hit bottom in November. They rebounded in December, under the influence of higher quotations. Then, in January, sales of finished steel declined more than seasonally. Judging by known conditions in the chief consuming industries and by the trend of unfilled orders, there was no improvement in February.

Rate of change in unfilled orders of the Steel Corporation usually constitutes a good index of sales. The *rate* of increase fell off slightly in December and a trifle more in January, followed by an abrupt decrease in February. In the past, this has indicated a decline in steel scrap prices and in the price of steel stocks on the exchanges.

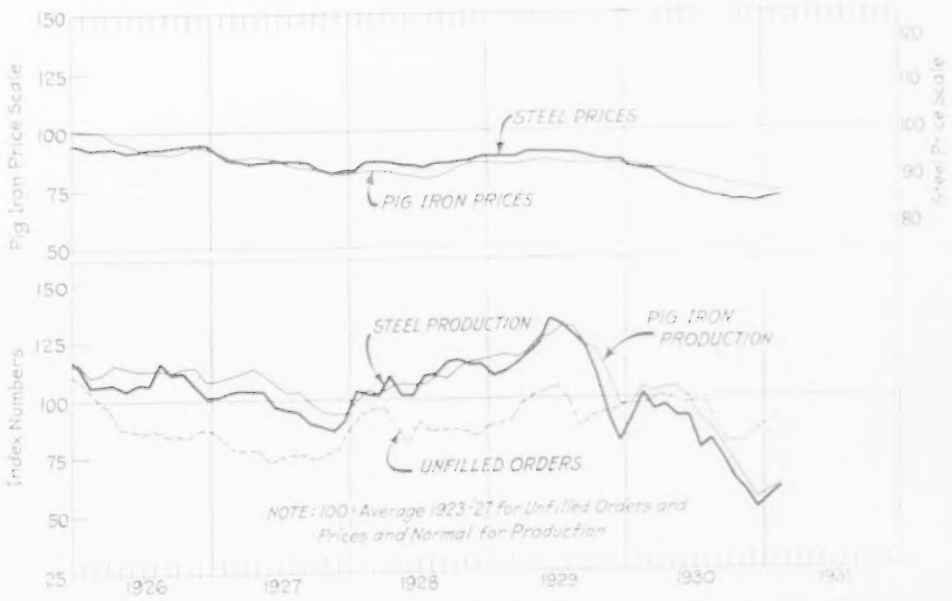
Taking the average for 1923-1927 as a base, the average price of finished steel in February was 84.9—a slight advance from January. It compares with 91.4 a year ago, and with 79.5 of February, 1932. On the other hand, pig iron averaged lower in February, being 73.6 (on the same base), against 84.2 a year ago and 84.8 in February, 1922.

Statistical indications suggest these conclusions: Finished steel prices are likely to continue irregular. Pig iron prices are likely to hold relatively well and to show increasing firmness. Steel scrap prices will probably continue weak.

Do the gains in production represent the beginning of a sustained recovery in industrial activity? Precedent in this case throws some light on the possibilities. Near the bottoms of most cycles there has been a preliminary upturn in pig iron production, running for two to four months. It has been rather common for stock market averages to rebound from a "primary" bottom and for pig iron production to do the same shortly afterward.

This was true in 1893-1894, 1903-1904, and even in 1907-1908, though in this case the rebound was short and small. Again in 1910-1911 and the middle of 1919 we find some similar developments. Early in 1914 a temporary rebound followed a severe recession in pig iron production. Even in May, 1921, a slight upturn (which may be called premonitory) occurred in advance of the final low point.

While precedent thus strongly indicates a secondary decline in production, it does not follow that any further recession would carry production to a new low level. Sometimes that has happened, as in 1894, 1914 and 1919, but in other cases the "secondary" bottom of the pig iron curve has either not fallen so low or has reached only about the same level as the primary bottom, which in the current cycle we take to have been made last December.



Steel and pig iron production appear to have advanced beyond demand. Prices may be weak, except perhaps for pig iron, for a month or more.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

A Stumbling Block to Stabilization

IN this issue of THE IRON AGE is an account of the decision of the Federal court, dissolving the Bolt, Nut and Rivet Manufacturers' Association. This is of interest to all similar groups in the metal-working industry, not only as throwing light upon the Government's attitude toward the interpretation and enforcement of the anti-trust laws, but because of the probable deterring effect of this legislation on future business stabilization.

The important part of this decree is its interpretation of the words "concertedly" and "concerted." These words are specifically defined, and, according to the decree, "should not be construed to include merely simultaneous or independent action taken on the part of two or more defendants."

American industry is facing a period when "concerted" action will be found indispensable. If we are to avoid a repetition of the bitter experience of the past 18 months of depression, some way must be found to avoid overproduction. This can be done only by "concerted" effort to control production volumes.

There are but two ways in which this may be done. One is by Governmental budgeting of production volumes; the other is by mutual planning and agreement between the producing units of each industry.

Russia is now experimenting with the former plan, which makes government the dictator of the nation's business. Abolishing private and individual initiative, as it does, this way of approaching the problem is distasteful to all classes of Americans except the small, un-American class of Soviet admirers.

The one feasible American way of approaching this problem is through mutual planning and understanding among trade associations, which bring together, in related groups, nearly all of our present producing units. In these groups, and nowhere else, can we expect to find the means of effective and efficient self-regulation of volumes.

If these groups are to function for the much needed regularization of industry and employment, we must remove the hobbles now imposed upon them by the anti-trust acts. These restrictions, in part at least, have outlived their usefulness and constitute an increasingly expensive burden on our economic structure.

A tribute to alloy steels, their efficiency and dependability is found in their application to the vital parts of Captain Malcolm's "Bluebird"—the automobile with which he broke all speed records in February at 245 miles an hour. Several types of alloy steels—nickel, nickel-chrome, nickel-chrome-molybdenum and so on—were incorporated in certain parts where the greatest possible strength and resistance to stress and vibration were required. The record would have been impossible except for the insurance afforded by such steels. And a few years ago such a car could not have been constructed, for steels of the character used were not known. Great strides have been made in their complexity as to composition, in their uniformity as to quality and in their perfection due to heat treatment. Knowledge of the value of molybdenum and vanadium as additions to the original older nickel and chromium steels has broadened markedly recently, resulting in ternary steels to meet special engineering problems.

Price Trends and Trade Recovery

COMMODITY price trends furnish some indication of underlying economic conditions and may be helpful as an indicator of the future of trade, but an error may be made in the weight attached to the phenomena. There is reason to believe that too much weight is now being given them. Naturally enough there is a strong disposition to gage the future by the past, to derive formulas from the course of affairs in other depressions, but one must remember that depressions are quite different, both as to the things which brought them on or, to speak more broadly, the conditions which preceded them, and as to the conditions, both physical and mental, existing during the depression.

It is a loose generalization that prices fall during a depression, for the fact that it is substantially true does not cover the ground. Prices have declined when there was no depression. From the close of the Civil War to about 1897 prices declined almost continuously and at much the same percentage rates. Some observers have got around that point by generalizing that after a big war prices decline for about 30 years, citing the experience just mentioned and that after the Napoleonic wars and our own war of 1812. The number of citations is quite small, and why should the period be 30 years instead of 20 or 40? There is an obvious principle that, other things being equal, prices would naturally trend downward through improvements being made—more efficiency, discovery of natural resources, etc. There is always some cause that starts prices upward, the movement being in essence an interruption of the decline.

Particularly dangerous is the practice of judging the whole thing by an average of prices, no matter how scientific the weighting of the various commodities may be. What is the correct weighting for one

time is not the correct weighting for another time. There is about the same quantity of wheat in the average budget as in 1915, but in that year only one-tenth as many budgets included the maintenance of an automobile, whereby wheat in the same volume would now represent a smaller percentage of the budget. Innumerable illustrations can be drawn along that same line.

Likewise there is danger in comparing prices of different groups of commodities, whereby one might be moved to say that certain commodities have not declined enough to satisfy his formula of what has to happen before the foundation of recovery is laid. Given a period of unchanged average price of all commodities, there will be upward movements in some and downward movements in others, so why not marked variations when the general average is moving?

In past depressions there was a theory that prices needed to come down to an extent that would "attract capital," and when business recovered the economists were disposed to say: "There; what did I tell you?" One can fancy no such attitude on the part of capital now. Capital is not worrying about costs now, but about safety of principal. Given a promising project, capital will not wait for lower costs. It may feel that a given project is not promising now because patronage would be doubtful while some time in the future patronage would be assured, but that would not be a matter of waiting for costs to come down.

Uplifting the Scrap Trade

EVERYONE who consumes or produces iron and steel scrap undoubtedly welcomes the efforts that have been made by the Institute of Scrap Iron and Steel during the three years of its existence to place this industry upon a basis of sound and straightforward business practices. The steel industry in particular, which buys millions of tons a year of old material, has cause for thankfulness that this hitherto uncontrolled and highly individualistic business has come under the guidance of a national organization whose aims and purposes, as outlined at its third annual convention at Cleveland last week, are to establish trading in iron and steel scrap as nearly beyond reproach as can be.

No group of business men could have undergone more critical self-examination than did these scrap men at their recent meeting. There was no attempt to condone the faults of the past, but rather a desire to escape as hastily as possible from the stigma which has attached to questionable methods.

The scrap industry seems to exhibit a sincere desire to purge itself of anything which may have brought it into more or less ill repute. It seeks to escape from the heritage of the "junk complex," which has been fixed in the public mind for a generation; it avowedly recognizes the value of public opinion and wishes to cultivate it; it wishes to get rid of elements which cannot or will not conform to the program of uplift it has set for itself.

"We want to know," said Benjamin Schwartz, director general of the scrap organization, "that we are surrounded by men who desire to stay in this business and who wish to make out of it a respectable and profitable one."

Saying also that "it is too much to expect that a whole generation of cut-throat competition and confiscation should change overnight, or even in three years," Mr. Schwartz held out hopes for a brighter era for the scrap iron industry if it hewed to the line of a high plane of business conduct, but predicted that it may go back to "its horses and wagons" if the old policies were continued.

Coming into the scrap organization three years ago from the practice of law, Mr. Schwartz has impressed many as to his sincerity, his organizing genius and his capacity in building up a responsible association to control the previously unrestrained dealings of a trade which had learned to live mostly by its wits. "Doctoring" of cars and other evils of scrap trading may not have been wholly eliminated, but much progress already has been made and the scrap institute declares itself ready and anxious to punish all offenders against ordinary business honesty and sound business practice. For this accomplishment alone, the consumers of scrap must feel grateful, and the time is here when producers and users of scrap should lend their earnest cooperation in whatever steps may be taken to correct any further evils that may exist in the handling of this essential raw material.

Now that the scrap trade has been putting its own house in order, it begins to find some flaws in the policies of large producers and consumers of scrap. In a resolution adopted at the Cleveland convention it charges certain railroads with unfairness in the disposition of their large tonnages of scrap, wherein discrimination against the scrap dealer is claimed, and it asserts with a great deal of vigor that "direct dealing" between producer and consumer, by which is meant the intentional elimination of the scrap dealer, is "uneconomic and unfair." It appeals to the American Iron and Steel Institute to lend its aid in putting a check on this practice on the ground that the scrap-gathering and scrap-preparing machinery of the trade is essential to the well-being of the entire steel industry.

But with no effort at exculpation, the scrap institute, in the words of its director general, admits that "there is accumulating evidence that many consumers are not satisfied with the service we have rendered. We are responsible for our own difficulties; we need not look elsewhere."

Need We Fear Russia?

IT is to be conceived that the many persons in this country and others who are becoming hysterical in thinking of Russian industrial competition and are prophesying the dragging down of civilization to the communistic level have not given any time to analysis of the principles of economy. To them the amazing Five-Year Plan looms simply as a Sword of Damocles.

Russia is a land of great natural resources, in which respect it is more like the United States than any other national entity. Like the United States

it lacks rubber and tin. It possesses manganese which we do not, except in a poor way. On the other hand, it is doubtful if its resources in copper, lead and zinc are so bountiful as ours. Its wheat fields are nearer to seaports than ours and near the Arctic Ocean it has some virgin forest.

Wheat, wood, petroleum, manganese and coal are the commodities that it has to sell, whereof only wheat and petroleum compete with us in export markets. In so far as we are concerned at home, the only question of moment is whether we need be apprehensive if the Russians choose to sell us cheap wood, manganese and coal.

In selling those commodities to us the Russians are depriving themselves of their resources and labor in order to create credits out of which to buy manufactures and services from us. So far there is in this nothing alarming. The fear is concisely expressed as follows:

"In a few years' time, when all the factories now being built are fully working, with the country's vast internal resources and the energy of 150,000,000 people to draw upon, they not only will provide all that the Russian people want, but will swamp the world with cheap goods with which other industrial nations can not compete."

This idea leads to a consideration of why 125,000,000 Americans with a wealth of natural resources may be beaten by 150,000,000 Russians, also possessing bounteous natural resources, but not on the whole superior to our own so far as we can now discern. Are the Russians superior to ourselves in industrial genius? Even after successful consummation of their five-year plan are they going to be better equipped with factories and railroads? Any answers other than in the negative would be not only mortifying, but also acknowledging that for a century we have been misguided and more or less wasting our time and energy.

It may be suggested that cheap labor spells the difference, but it has been our contention that labor is worthy of its hire and it has been our observation that cheap, or conscripted, or slave labor has never been competitive with skilled and commensurately remunerated labor. Is our philosophy entirely wrong?

We imagine that the Russian people are feverishly building factories, and power supply and means of transportation in order to provide adequate housing, fuel, food and clothing for themselves, in all of which respects they are at present pitifully deficient. They have tightened their belts and are temporarily content with starvation and discomfort at home while there is plenty abroad. The object of the Five-Year Plan is to improve that condition as quickly as possible. As soon as they are able to do so, the Russians ought to produce for themselves.

In respect to manufactures the fundamental question is efficiency in production. The present fear is that production by a people content with a low scale of living will pull down competitively the scale of living that has been attained in other countries, even America. This overlooks that a rise in the scale of living is a consequence of efficiency, not the other way around. Russia is not the only place where there is cheap labor. In Poland it is also cheap. When the Anaconda company entered into production in Upper Silesia it improved efficiency and part of its program was to get more food into the workers. A man, like a horse, has to be stoked with adequate fuel, measured in calories, if one is to get out of him the maximum of energy. American engineers who have operated in many foreign countries have never become convinced of the advantage of cheap labor.

It is argued that Russian production is free from overhead expense, but, of course, that is not so. There is cost of government in Russia, which besides other administrations is constrained to maintain a great army. Capital is canned labor, whether it is individualistic or communistic. The Soviet system benefits only by what was confiscated, much of which was allowed to decay. There are no high salaries in Russia, but we have the idea that high salaries are usually enjoyed because they are earned. The great difference between our economy and the communistic as developed in Russia is that in the latter there is no quarreling in respect to the division of the produce of industry and therefore no unemployment. Is equality in poverty worth while?

The "Progressive" Programs

THE recent "Progressive" conference in Washington convened by some of the malcontent senators and attended by about 200 "intellectuals" spreading out into what President Roosevelt described as the "lunatic fringe" developed nothing beyond what had previously been expressed with verbosity in the Senate, but it was a great opportunity to obtain publicity through the newspapers.

Senator Norris denounced the "power trust," which is a mythical dragon unvisualized by anyone of intelligence, but serving as the symbol for the emotional thesis that "the power of wealth must be curbed in its selfish and unholy ambition." This boils down to a cursing of the rich.

Senator Borah leans the same way, but his pet project is to promote the welfare of the wheat growers by giving them a bounty under the name of an export debenture. Senator Borah does not exactly curse the rich, but he prescribes in the direction of national impoverishment.

These formulas lead to communism, as exemplified in Russia, where there are no rich to be cursed, and likewise there are no bounties to be enjoyed, everybody being equal in poverty. William Green and the labor leaders do not, therefore, indorse the prescriptions of Mr. Norris and Mr. Borah. If there be no corporations and no rich there will be no wages and no workingmen will ride in automobiles. Mr. Green and his associates may be poor salesmen, but they know on which side their bread is buttered.

Also conscious are the millions of stockholders in corporations who really comprise Senator Norris' power trust and all of the other trusts that he can imagine. If the dividends that result from their thrift are curtailed they cannot buy so much of goods, and [illegible]. But why pursue the rational line of thought?

Demand from Automobile and Construction Industries Rising

STEEL Ingot Output Now 57 Per Cent of Capacity—Little Interest Shown in Second Quarter Steel Prices—Scrap Markets Apathetic

EXPANSION of steel demand, although by no means spectacular, is unchecked, and further gains are indicated by the broadening requirements of the automobile and construction industries.

Steel ingot output for the country at large has risen from 55 to 57 per cent, with the greatest gains reported at Cleveland, where production is now 70 per cent of capacity, and at Chicago, where the district average is 62 per cent, with the rate of one producer 75 per cent. Three blast furnaces have been added to the list of active stacks, one each having been lighted in the Alabama, Youngstown and Chicago districts.

Price changes are few in number and indecisive in character, reflecting no general trend either upward or downward.

Finished steel specifications at Chicago are 25 per cent above the average for the year to date, while bookings at New York are running 10 to 20 per cent over those of February. Cleveland also reports substantial gains, chiefly attributable to the expanding needs of the automobile industry.

MOTOR car demand for steel is conspicuous for its uninterrupted expansion. Orders from the Detroit district, however, usually call for seven to 10 days' delivery and, as a consequence, mills serving the automobile trade have virtually no backlogs, although their shipments from week to week are steadily increasing. In the face of this extreme conservatism, every week brings more definite signs of a sustained gain in motor car production. First quarter output for the United States and Canada is now estimated at 700,000 cars, while peak production of the year is expected to come later than usual, possibly in May or June.

CONSTRUCTION activity promises to be a large outlet for steel in coming months. The Pacific Gas & Electric Co., which last week contracted for 20,000 tons of steel pipe for a gas line, has placed additional orders for 30,000 tons, dividing them between the A. O. Smith Corpn. and the Western Pipe & Steel Co. The general contract for the Hoover dam has been placed and the steel requirements, amounting to 49,000 tons, will doubtless be awarded in the near future.

New fabricated structural steel projects total 152,000 tons, of which 125,000 tons is represented by bridge and station construction and electrification work for the Pennsylvania Railroad. Structural steel inquiries reported by THE IRON AGE thus far this year call for a total of 696,500 tons, compared with 288,000 tons in the corresponding period last year and 464,300 tons two years ago. Fabricated steel lettings of the past week amounted to only 16,000 tons, but 160,000 tons for the Metropolitan Square Corpn., New York, will be contracted for shortly, if it has not already been tentatively awarded.

MISCELLANEOUS consumers taking more steel include builders of road machinery, makers of galvanized roofing stock and culvert materials, manufacturers of sheet steel building products, and producers of steel furniture and electric refrigerators. On the other hand, farm equipment manufacturers have curtailed their operations. At present low prices for feed, the horse is again a formidable competitor of the tractor from the standpoint of investment and operating costs.

MOST makers of wire rods, wire and wire nails, have adopted the advance of $2 a ton for second quarter first announced a week ago. Likewise most producers of bars, plates and shapes are quoting 1.65c. a lb., Pittsburgh, for the coming quarter. Lack of interest on the part of consumers has thus far prevented these quotations from undergoing a real test. In the case of plates, shapes and bars the fact that most of the tonnage shipped this quarter has been at 1.60c. may influence the attitude of buyers, notwithstanding that the spot price has been $1 a ton higher since the first of the year. Willingness of sheet mills to accept second quarter contracts at recent prices is complicated by the appearance of fresh weakness in current transactions. Automobile body sheets have declined $2 a ton to 3.20c. a lb., Pittsburgh. Black sheets have been shaded $2 a ton to 2.25c., Pittsburgh, while scattered sales of galvanized sheets have been made at concessions of $1 a ton.

Pig iron prices are on the whole unresponsive in a quiet market, with increases in demand confined chiefly to the automobile industry. Alabama producers have announced an advance of 50c. a ton to $11, Birmingham, on iron for Northern delivery, while Cleveland producers have reduced prices 50c. a ton for local shipment. Scrap is sluggish, with prices for the most part marking time.

The monthly index of machine tool orders, compiled by the National Machine Tool Builders' Association, rose to 83.7 in February from 66.9 in January.

THE IRON AGE composite prices are unchanged, finished steel at 2.142c. a lb., pig iron at $15.71 a ton and steel scrap at $11.08 a ton. Steel is $3.40 a net ton lower than a year ago, pig iron is down $2.04 a gross ton, and scrap, $3.92 a gross ton.

PITTSBURGH

Steel Trend Upward, Though Rate of Increase Is Still Slow

PITTSBURGH, March 17.—The trend of specifications for finished steel products is still upward, but gains are very slow. While the releases received by one large producer last week were the heaviest of the year to date, this circumstance is not indicative of any sharp gain in consumption. Shipments to the automotive industry are still holding up, and the requirements of miscellaneous consumers are steady, though restricted. Weather conditions in the last week seem to have set back construction work considerably, and makers of structural steel and reinforcing bars still report very slow releases.

The larger companies, with a diversified line of products, are maintaining production schedules without much difficulty, but there has been little gain in output in the last week. The leading interest is running its steel-making units at about 55 per cent of capacity and independent companies in the Pittsburgh district average from 40 to 50 per cent. Under the circumstances the producing rate of the local industry is still estimated at not much more than 50 per cent. Valley open-hearth capacity is running at about 55 per cent, but production in the Wheeling district has eased off slightly from the 65 per cent rate prevailing last week.

Generally speaking, finishing mill production during the last week has held its own. Sheet mills are running at a somewhat higher rate at certain points, but the leading interest has not increased its aggregate production. Tin mill schedules have declined slightly at one or two plants, but the average for this branch of the industry is holding at close to 75 per cent. Makers of hot-rolled strip are running this week at from 55 to 60 per cent of capacity. Production of rails has also gained.

Second quarter prices are the primary interest of both buyers and sellers of steel at this time. On bars, plates and shapes leading makers are trying to establish the market on a 1.65c. base, which is $1 higher than the general shipping price during the first quarter. In most cases the higher price is being adhered to, particularly on bars. While a few large users of strip steel have been able to enter second quarter contracts at the old levels, recently advanced prices are holding in this territory. No opportunity has been offered to test the higher prices recently named on wire products, although they are now being quoted by all the principal makers. On other finished steel commodities, old prices are being adhered to in taking second quarter contracts.

Gains in steel specifications continue, although the rate of increase is very gradual.

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Shipments to automobile industry holding up, and miscellaneous demands are steady, though restricted.

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Variations occur in operating rates from week to week among individual plants, but average for district remains at 50 per cent or slightly more.

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Efforts being made to establish 1.65c. price on bars, shapes and plates for second quarter contracts.

* * *

Scrap market holding fairly steady, though demand is not large.

Pig Iron

Sales of foundry iron in the Pittsburgh district have been somewhat heavier in the last week or two. Several users have placed small lots at $17, Neville Island, and in some cases this iron will be shipped from the Valley at the Neville Island price plus freight rate from this furnace. While talk of an advance in Valley quotations on foundry iron has been heard, recent sales in the Pittsburgh district do not bear this out. Malleable and Bessemer iron are unchanged at $17, Valley, and $17.50, Neville Island, and basic is holding at a nominal price of $16.50, Valley. Shipments this month have improved slightly over February, but are scarcely 25 per cent of capacity requirements.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$16.50
Bessemer	17.00
Gray forge	16.00
No. 2 foundry	16.50
No. 3 foundry	16.00
Malleable	17.00
Low phos., copper free	$26.50 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton f.o.b. Pittsburgh district furnace:

Basic	$17.00
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 65c. to $1.13.

Semi-Finished Steel

While sellers of billets, slabs and sheet bars are willing to take second quarter business on the basis of $30, Pittsburgh, no inquiry has appeared and the market is generally quiet. Shipments to non-integrated makers of sheets, strip and tin plate are running somewhat heavier, reflecting the better operations of finishing mills. Forging billets are still quoted at $36, Pittsburgh, although the market has not been tested by second quarter buying. Makers of wire rods are generally quoting $37 for second quarter tonnage, an advance of $2 a ton over recent quotations.

Rails and Track Accessories

Mill operations are still expanding slightly, reflecting the heavier seasonal specifications of the railroads. On track accessories gains in releases are more noticeable, as rail production has not increased over the 50 per cent rate. Little new business in either rails or track materials is coming out.

Bars, Plates and Shapes

The approach of open weather has not yet been reflected to a noticeable extent in orders for structural material received by steel companies. Weather conditions last week served to deter construction activity, which had begun to get under way, and orders for structural shapes and reinforcing bars showed no appreciable increase. On the other hand, new inquiry is still accumulating, and the gain in new construction reported by the building statistics agencies is considered very encouraging. Plate demand is also rather quiet, although specifications from barge builders are reaching mills in good volume. Fabricators of steel tanks and railroad car builders are running very slowly. Demand for steel bars from the automobile industry is still encouraging, but the general requirements of miscellaneous consumers continue rather restricted.

Leading producers of bars, plates and shapes are not advancing second quarter quotations, and are soliciting business for that period at 1.65c., Pittsburgh. Although this represents no advance in asking prices, shipments in the last three months have largely been made on the basis of 1.60c. or less, and, if the 1.65c. price holds, it will represent a $1 a ton increase for most users. No adequate test of the market has yet been offered, although producers report that their bar customers have shown a dis-

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous. Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Mar. 17, 1931	Mar. 10, 1931	Feb. 17, 1931	Mar. 18, 1930
No. 2 fdy., Philadelphia	$17.76	$17.76	$17.76	$20.26
No. 2, Valley furnace	16.50	16.50	16.50	18.50
No. 2 Southern, Cin'ti	14.19	14.19	14.19	16.69
No. 2, Birmingham	12.00	12.50	13.00	14.00
No. 2 foundry, Chicago*	17.50	17.50	17.50	19.50
Basic, del'd eastern Pa.	17.25	17.25	17.25	19.00
Basic, Valley furnace	16.50	16.50	16.50	18.50
Valley Bessemer, del'd P'gh	18.76	18.76	18.76	20.76
Malleable, Chicago*	17.50	17.50	17.50	19.50
Malleable, Valley	17.00	17.00	17.00	19.00
L. S. charcoal, Chicago	27.04	27.04	27.04	25.04
Ferromanganese, furnace	80.00	80.00	80.00	94.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	30.00	30.00	30.00	32.00
Sheet bars, Pittsburgh	30.00	30.00	30.00	32.00
Slabs, Pittsburgh	30.00	30.00	30.00	32.00
Forging billets, Pittsburgh	36.00	36.00	36.00	38.00
Wire rods, Pittsburgh	35.00	35.00	35.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.85
Finished Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.65	1.65	1.65	1.85
Bars, Chicago	1.70	1.70	1.70	1.95
Bars, Cleveland	1.70	1.70	1.70	1.85
Bars, New York	1.98	1.98	1.98	2.19
Tank plates, Pittsburgh	1.65	1.65	1.65	1.80
Tank plates, Chicago	1.70	1.70	1.70	1.95
Tank plates, New York	1.93	1.93	1.93	2.07½
Structural shapes, Pittsburgh	1.65	1.65	1.65	1.80
Structural shapes, Chicago	1.70	1.70	1.70	1.95
Structural shapes, New York	1.90½	1.90½	1.90½	2.04½
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.55	1.55	1.55	1.80
Cold-rolled strips, Pittsburgh	2.25	2.25	2.25	2.55

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel,	Mar. 17, 1931	Mar. 10, 1931	Feb. 17, 1931	Mar. 18, 1930
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	2.35	2.35	2.35	2.65
Sheets, black, No. 24, Chicago dist. mill	2.45	2.45	2.45	2.75
Sheets, galv., No. 24, P'gh	2.90	2.90	2.90	3.50
Sheets, galv., No. 24, Chicago dist. mill	3.00	3.00	3.00	3.40
Sheets, blue, No. 10, P'gh	2.05	2.05	2.05	2.25
Sheets, blue, No. 10, Chicago dist. mill	2.15	2.15	2.15	2.35
Wire nails, Pittsburgh	1.90	1.90	1.90	2.25
Wire nails, Chicago dist. mill	1.95	1.95	1.95	2.35
Plain wire, Pittsburgh	2.20	2.20	2.20	2.40
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.45
Barbed wire, galv., P'gh	2.65	2.65	2.75	2.95
Barbed wire, galv., Chicago dist. mill	2.60	2.60	2.60	3.00
Tin plate, 100 lb. box, P'gh	$5.00	$5.00	$5.00	$5.25
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$12.75	$12.75	$12.75	$16.50
Heavy melting steel, Phila.	10.50	10.50	10.50	15.00
Heavy melting steel, Ch'go	10.00	10.00	10.00	13.25
Carwheels, Chicago	10.50	10.50	10.50	14.50
Carwheels, Philadelphia	13.50	13.50	13.50	15.00
No. 1 cast, Pittsburgh	12.50	12.50	12.50	14.50
No. 1 cast, Philadelphia	11.50	11.50	11.50	15.00
No. 1 cast, Chgo. (net ton)	9.50	9.50	9.50	13.25
No. 1 RR. wrot., Phila.	12.00	12.00	12.00	15.00
No. 1 RR. wrot., Ch'go (net)	8.00	8.00	8.00	12.25
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$2.50	$2.50	$2.50	$2.60
Foundry coke, prompt	3.50	3.50	3.50	3.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	10.12½	10.62½	10.12½	18.12½
Electrolytic copper, refinery	9.75	10.00	9.75	17.75
Tin (Straits), New York	27.50	27.20	26.00	36.12½
Zinc, East St. Louis	4.00	4.05	4.00	4.95
Zinc, New York	4.45	4.40	4.75	5.30
Lead, St. Louis	4.25	4.35	4.30	5.40
Lead, New York	4.50	4.60	4.56	5.50
Antimony (Asiatic), N. Y.	7.25	7.05	7.10	8.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

position to close contracts at the higher level. On plates and shapes, desirable orders have been taken at even less than 1.60c. in recent weeks, and a higher price will be much more difficult to obtain than in the case of bars.

Cold-Finished Steel Bars

Specifications from the automobile industry have held their own in the last week, but there has been no material improvement. General demand continues to broaden slightly, although some large consuming industries, particularly the agricultural implement makers, have failed to increase their needs. Machinery makers have steadily added to their tonnage since the first of the year, although aggregate demand from this source still leaves much to be desired. Second quarter contracts are being taken at 2.10c., Pittsburgh, and the market appears to be well maintained at that level.

Sheets

Demand for sheet steel is gradually broadening as spring weather approaches, but no single consuming industry is providing definite impetus. Specifications from automobile makers are still coming in at a good rate, and this industry is also inquiring for considerable second quarter tonnage. While some of this business has been closed in the last week, Michigan companies are inclined to be hesitant in placing forward orders. Demand for galvanized roofing stock and culvert materials has shown some gain, and makers of sheet steel building products are somewhat more active. This is also true in the case of steel furniture makers and producers of electric refrigerators.

Despite gradual broadening demand, operations have not shown much gain this month. The leading interest continues to operate its mills at about 40 per cent of capacity, and while certain independents are maintaining a 50 per cent rate, production is still rather spotty. At a number of points sheet units are still running every other week, and it is difficult to gage current aggregate production. However, estimates generally run above 45 per cent.

Sheet makers are not actively soliciting second quarter contracts, although they are willing to take business at unchanged prices. Inquiry is not yet heavy, and current small tonnages are being taken at the present quoted schedules.

Tin Plate

While one or two independent companies have checked their operating schedules slightly in the last week, the leading interest continues to run at about 70 per cent of capacity, and aggregate output in the district does not appear to have been curtailed seriously. At least two large independent companies are running at capacity, and the operating rate of the industry may still be estimated at 75 per cent. In one or two cases can companies have asked mills to reduce shipments slightly, but this curtailment seems to be only temporary.

Bolts, Nuts and Rivets

While producers have opened their books for second quarter at unchanged prices, contracting is rather slow, and current specifications have gained only slightly. Mills in this district are running at about 40 per

THE IRON AGE COMPOSITE PRICES

	Finished Steel	Pig Iron	Steel Scrap
March 17, 1931	2.142c. a Lb.	$15.71 a Gross Ton	$11.08 a Gross Ton
One week ago	2.142c.	15.71	11.08
One month ago	2.142c.	15.71	11.08
One year ago	2.312c.	17.75	15.00
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1931	2.142c., Jan. 13;	2.121c., Jan. 6	$15.90, Jan. 6;	$15.71, Feb. 17	$11.33, Jan. 6;	$11.08, Feb. 17
1930	2.362c., Jan. 7;	2.121c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.412c., April 2;	2.362c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.391c., Dec. 11;	2.314c., Jan. 3	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 3
1927	2.453c., Jan. 4;	2.293c., Oct. 25	19.71, Jan. 4;	17.04, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22
1926	2.453c., Jan. 5;	2.403c., May 18	21.54, Jan. 5;	19.16, July 13	17.25, Jan. 5;	14.00, June 1
1925	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13;	18.96, July 7	20.83, Jan. 13;	15.08, May 5

cent of capacity, and current releases do not indicate any marked gains in the near future.

Wire Products

Producers are generally naming second quarter prices at $2 above recent levels, and the advance has stirred up considerable consumer interest. While new business has not been in sufficient volume to test the new prices, producers are encouraged by the reception of the changes on the part of buyers. Specifications in the last week have improved slightly, and shipments of manufacturers' wire to the automobile industry are showing an encouraging gain. Otherwise, the manufacturing trade is doing very little buying. Users of spring wire have had particularly light requirements, and the cold heading trade is dull. Jobber demand is still light and orders are generally small and for urgent shipment. Producers are quoting $2 a keg for nails, and 2.30c., Pittsburgh, for manufacturers' wire.

Strip Steel

Interest in this market is centered on prices and, with considerable business to quote on during the next week, manufacturers will be able to determine the success of their effort to advance quotations. While some large buyers in the Detroit area are reported to have been able to book their second quarter requirements of hot-rolled strip at the old prices of 1.55c. and 1.65c., Pittsburgh, a large number of smaller users have contracted at the advanced levels. The recently announced 2.35c., Pittsburgh price on cold-rolled strip is being adhered to somewhat better. Specifications continue to improve at an encouraging rate, and hot mills ran last week at better than 55 per cent of capacity. Further increase is expected this week which may carry operations to 60 per cent. Production of cold-rolled strip is at about 45 per cent.

Tubular Goods

Line pipe tonnage in the market is rather slow in closing, and difficulties with financing and securing right of way are responsible in some cases. An Arkansas gas company has ordered 60 miles of 8-in. material, amounting to about 3000 tons, from a Valley producer. Otherwise no tonnage of importance is reported closed, although several projects are very active. The Montana Power Co., which has contemplated some extensive pipe line developments for quite a time, is said to be ready to place orders for much of this material. Standard pipe is still very dull, and seasonal improvement is below normal. Mechanical tubing is comparatively active, although aggregate tonnage is light. Pipe mill operations are not averaging more than 35 per cent of capacity on the whole, although a few units are well engaged.

Refractories

Leading makers of refractory materials have reduced prices of fire clay brick $3 a ton to $40 per 1000, f.o.b. works, for the high-heat quality. The intermediate grade is quoted at $32. Silica brick has also been reduced $3 per 1000, while ground fire clay and silica clay are 50c. lower. Fire clay is now quoted at $6.50 per ton, and silica clay at $8 per ton. Magnesite and chrome brick are unchanged.

Coke

Cold weather last week brought a temporary improvement in orders for domestic coke, although this business is expected to be the last of the season. Foundry coke is still very quiet, and users are showing no interest in second quarter requirements. The Sharon Steel Hoop Co. is in the market for its second quarter furnace coke needs, and an eastern Pennsylvania merchant furnace interest is reported to have closed for the next three months with its usual source of supply. The market on furnace coke is weak at $2.50, Connellsville.

Old Material

With practically no consumer purchases of heavy melting steel reported in the last week, the market on this grade is holding at recent levels. As the last sales of No. 1 heavy melting steel were made at $13, this grade is quotable at $12.50 to $13. Most dealers would be willing to sell at the higher figure. Hydraulic compressed sheets were bought by a Pittsburgh consumer in substantial tonnage at $12.75 and this figure seems to represent the top of that market. One consumer is said to have bought machine shop turnings at $8, which is in line with recent quotations. Consumption of scrap has declined slightly, with a hold-up reported at one important shipping point.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$12.50 to $13.00
No. 2 heavy melting steel	11.25 to 11.75
Scrap rails	12.50 to 13.00
Compressed sheet steel	12.50 to 12.75
Bundled sheets, sides and ends	11.50 to 12.00
Cast iron carwheels	13.50 to 14.00
Sheet bar crops, ordinary	14.00 to 14.50
Heavy breakable cast	10.00 to 10.50
No. 2 railroad wrought	12.50 to 13.00
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	7.50 to 8.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	16.00 to 16.50
Railr. coil and leaf springs	16.00 to 16.50
Rolled steel wheels	16.00 to 16.50
Low phos. billet and bloom ends	18.00 to 18.50
Low phos. mill plates	15.00 to 16.00
Low phos. light grades	15.00 to 16.00
Low phos. sheet bar crops	16.50 to 17.00
Heavy steel axle turnings	11.00 to 11.50
Electric Furnace Grades:	
Low phos. punchings	15.00 to 16.00
Heavy steel axle turnings	11.00 to 11.50
Blast Furnace Grades:	
Short shoveling steel turnings	7.50 to 8.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Rolling Mill Grades:	
Steel car axles	18.00 to 18.50
Cupola Grades:	
No. 1 cast	12.00 to 13.00
Rails 3 ft. and under	14.00 to 14.50

Northern Equipment Co., Erie, Pa., manufacturer of feed water regulators, differential valves, pump governors and allied equipment, has appointed Bell & Eiss, Inc., National Life Building, Minneapolis, Minn., as its distributer in the Northwest, the Economy Equipment Co., Buder Building, St. Louis, as distributer in the St. Louis territory, and Joseph W. Eshelman, Webb-Crawford Building, Birmingham, as distributer in the Alabama territory.

CHICAGO

District Steel Operations Gain, with Average Now at 62 Per Cent

CHICAGO, March 17.—The curve of ingot production in the Chicago district is turning upward more sharply, in spite of the fact that rail output is off several points, following completion of a rush order. One producer is now slightly above 75 per cent of capacity and the average for the district as a whole is near the 62 per cent mark. There is also a gain of one steel mill blast furnace, a banked stack having been brought back into service at Gary Works. The leading producer is now blowing 10 stacks and the count for the district is 16 to 36 steel mill stacks, a net gain of four since the turn of the year.

Current specifications are running fully 25 per cent above the average for the year thus far, which is considered by the trade as a satisfactory showing in view of business as a whole. Sheet mills are more active at 70 per cent of capacity. New orders, which are at close range, amply support this rate of output.

Quotations on wire and wire products, as well as rods, have taken a step upward, but the heavy tonnage products can boast of nothing more than greater stability at present levels.

News in the railroad equipment field is confined to the Northern Pacific's orders for 500 underframes and a like number of superstructure sets, the cars to be built in the railroad's shops.

An improved tone is noted in demand for storage tanks and releases for plates for the manufacture of line pipe are giving very effective support to steel mill operations. On the less optimistic side of the market are curtailed operations by farm implement manufacturers, who are being confronted with the argument that at present prices for feed the horse becomes a more important factor in resistance to tractor sales.

One characteristic quite evident throughout the market is lack of impulse by consumers to enter commitments for the second quarter.

Steel operations continue upward trend, with one company now at 75 per cent and average for district at 62 per cent.

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Resumption of blast furnace at Gary brings total active steel mill stacks to 16 of 36 in district.

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Current steel specifications running fully 25 per cent above average for the year.

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Pig iron shipments in March will exceed those of February by a small margin.

* * *

Scrap market undertone stronger, although price changes have not occurred.

Pig Iron

It seems assured that March shipments will exceed deliveries in February. This is true even when figuring on the basis of the daily rate. The margin, however, is not large. Buying for the second quarter has not been particularly active, but inquiries are increasing in number and a more satisfactory buying movement may develop. Resale iron, which has appeared recently in the market, is confined to a few odd cars. Northern iron at local furnaces is well established at $17.50 a ton. Southern iron for delivery to this district is priced at $11 a ton, Birmingham, to which must be added a $6.01 freight rate, bringing the delivered quotation to $17.01.

Prices per gross ton at Chicago

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	27.01
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, cop. per free	$28.50 to 29.20
Silvery, sil. 8 per cent	26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including an average switching charge of 61c. per gross ton.

Sheets

Demand for sheets is spreading rapidly, and output has been advanced to 70 per cent of capacity. Although books have been opened for second quarter, users are reluctant to make commitments for three months in advance, and current business is practically all for delivery in nearby weeks. The Middle West has worked its way out from under the recent snowstorm, and outdoor work is approaching the stride which it usually assumes at this time of year. Warehouses are taking larger quantities of sheets, not so much for the reason that distribution by them is larger, but as a move to replenish and round out stocks that have been closely restricted in recent months. Container manufacturers are finding more use for sheets, but cabinet production remains low. Backlogs at mills are light, and rolling schedules are difficult to arrange.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.50c. to 2.60c.; No. 24 galv., 3.05c. to 3.15c.; No. 10 blue ann'd, 2.05c. to 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Cast Iron Pipe

There is an improved undertone in this market, not alone because of new business placed and that out for figures, but also because new projects in attractive numbers are taking shape. Chicago will open bids this week on 3700 tons of 6 to 12-in. pipe and Fox Point, Wis., will close March 23 on about 45,000 ft. of 4 to 12-in. pipe, which will be used in construction of a water system. Rhinelander, Wis., will buy 250 tons of 4 to 14-in. pipe. Central Foundry Co. has taken 150 tons for Chisholm, Minn., and 100 tons for the Wisconsin Power & Light Co., Beloit, Wis.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $43 to $44; 4-in., $46 to $47; Class A and gas pipe, $3 extra.

Rails and Track Supplies

Rail production has receded several points as the result of completion of a rush order. However, specifications are still in good volume and there is a prospect that railroad needs will grow, especially in the northern parts of the country. The Milwaukee Road has not yet made formal inquiry for its estimated needs of 23,000 tons, though the trade believes that this tonnage will soon come into the market. New orders for accessories total 1200 tons. Releases against contracts for track supplies continue to grow, and production schedules are the highest in many months.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $46. *Per lb.* Standard railroad spikes, 2.80c.; track bolts with square nuts, 2.80c.; steel tie plates, 1.95c.; angle bars, 2.75c.

Bars

Demand for bar mill products continues to expand. Shipments of mild steel bars in the first half of March are well ahead of those of the closing weeks in February, and deliveries to a well diversified list of users continue to gain. Road machinery builders are active, but agricultural implement manufacturers are finding the tag end of winter a very dull period. Soft steel bars are steady at 1.70c. to 1.75c. a lb., Chicago. Heavier repairs are in evidence at railroad shops, which are making larger use of iron bars. This is the first impulse that this commodity has felt in months. Consump-

tion of alloy steel bars remains steady. Output of rail steel bars is in the range of 70 to 75 per cent of capacity. The bed industry has gained much headway in recent weeks.

Plates

Renewed vigor has come to the oil storage tank market. Local mills have received releases for 1500 tons of plates that are to be shipped at once to fabricators. A tank inquiry in Texas calls for 1500 tons and a user of small tanks in the Southwest is in the market for 500 tons of plates. The Northern Pacific has ordered 500 stock car underframes from Siems-Stembel Co. and still has to buy 500 superstructure sets. Recent pipe orders and releases against old contracts have done much to bolster plate shipments. Prices remain steady at 1.70c. to 1.75c. a lb., Chicago.

Structural Material

Developments in this market continue to come slowly, though unquestionably the undertone is improved. More small tonnages are being figured. Many of these do not turn into contracts promptly, but at the same time they reflect the growing interest in construction projects. Highway bridge and railroad work continue to keep an important place in the market, and public work holds much promise. Mill prices for shapes are steady at 1.70c. to 1.75c. a lb., Chicago.

Hot-Rolled Strip

Releases by miscellaneous users and manufacturers of automobile frames are showing moderate increases as March advances.

Wire Products

Most producers of wire and wire products have opened books for second quarter at advanced prices. Bright wire to the manufacturing trade is being quoted at 2.35c. a lb., Chicago, and $2.05, base, a keg is being asked of the jobbing trade for standard wire nails. The middle of March seems to have brought a halt to the upward trend of orders. Recent snowstorms throughout most of the West have been distinctly encouraging to agricultural regions. Demand for magnet wire by the radio industry is spotty, though, on the whole, somewhat larger. Public utilities have purchased heavy copper wire rather liberally, but specifications are dragging.

Warehouse Business

Distribution has failed to hold, let alone make a gain. This is contrary to performance in normal years, but it is exactly the situation that existed in March, 1922, the year following the last major depression. In that year, April warehouse business recovered rather sharply. Western warehouses are not following the lead of Eastern distributers in lowering prices on some sizes of galvanized sheets.

Wire Rods

Local producers are marking up prices $2 a ton to a range of $36 to $38 a ton. Demand is spotty and slow.

Reinforcing Bars

Orders for reinforcing bars are small in the aggregate, considering that fully 10,000 to 15,000 tons is overhanging the market. A turn for the better, if it can be gaged in a market of this kind, lies almost wholly in a slight increase in the number of small lettings. More road work is coming out in Minnesota. Cook County, Ill., will have a small letting in about a week. Contractors are slow in placing road tonnage, as work probably will not get under way near Chicago until well along in April.

Bolts, Nuts and Rivets

Specifications from many manufacturers of farm equipment, especially tractors, are pointed downward, but jobbers have stepped into the breach, with the net result that total specifications have varied little in the past two weeks. Second quarter contracts are being signed. Prices are steady.

Coke

Variations are few in this market since the beginning of the month. Prices are firm at $8 a ton, local ovens.

Old Material

Both buyers and sellers of scrap are showing greater concern over available supplies. It is generally understood that most heavy consumers have large stock piles, this being true of steel mills, and it evidently is their purpose to keep these stock piles well rounded out. This is indicated by the character of purchases of heavy melting steel in recent weeks, when there have been no large orders, but rather a consistent run of small ones. Steel mill operations have been slowly creeping upward, and there is a heavier call for cars on track in order that charging boxes can be filled without resorting to cutting down stocks. Brokers are having difficulty in meeting these requirements, principally for the reason that yard dealers' stocks of heavy melting steel are quite usually scanty.

Railroads have produced less scrap in the past six to 12 months than is their custom and, with retrenchment policies now in vogue, they probably have paid less than usual attention to gathering scrap. In any event, railroad lists are small and cars are long delayed in appearing on track. Notwithstanding this situation, brokers have not been able to obtain more than $10.25 a gross ton, delivered, for heavy melting steel, though it now has strength which it did not have late in February. Available supplies of factory scrap, including hydraulic sheets, are limited, while, on the other hand, tonnages of cast and malleable grades are a drug on the market. The Burlington will open bids on 2000 tons on March 24.

Prices deliv'd Chicago district consumers

	Per Gross Ton
Basic Open-Hearth Grades:	
Heavy melting steel	$9.75 to $10.25
Shoveling steel	9.75 to 10.25
Frogs, switches and guards, cut apart, and misc. rails	9.75 to 10.25
Factory hyd. comp. sheets	8.25 to 8.75
Drop forge flashings	6.75 to 7.25
No. 1 busheling	7.00 to 7.50
Forg'd cast and r'l'd steel carwheels	13.00 to 13.50
Railroad tires, charg. box size	13.00 to 13.50
Railroad leaf springs cut apart	13.00 to 13.50
Axle turnings	8.50 to 9.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	12.00 to 12.50
Coil springs	13.25 to 13.75
Electric Furnace Grades:	
Axle turnings	9.00 to 9.50
Low phos. punchings	11.25 to 11.75
Low phos. plates, 12 in. and under	11.00 to 11.50
Blast Furnace Grades:	
Cast iron borings	4.75 to 5.00
Short shoveling turnings	4.50 to 5.00
Machine shop turnings	4.25 to 4.75
Rolling Mill Grades:	
Iron rails	11.00 to 11.50
Rerolling rails	12.00 to 12.50
Cupola Grades:	
Steel rails, less than 3 ft.	11.50 to 12.00
Steel rails, less than 2 ft.	12.50 to 13.00
Angle bars, steel	11.00 to 11.50
Cast iron carwheels	10.50 to 11.00
Malleable Grades:	
Railroad	11.75 to 12.25
Agricultural	10.75 to 11.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	19.00 to 21.00
*Relaying rails, 65 lb. and heavier	22.00 to 27.00
	Per Net Ton
Rolling Mill Grades:	
Iron angle and splice bars	10.00 to 10.50
Iron arch bars, and transoms	11.00 to 11.50
Iron car axles	17.00 to 18.00
Steel car axles	12.00 to 12.50
No. 1 railroad wrought	8.00 to 8.50
No. 2 railroad wrought	8.50 to 9.00
No. 1 busheling	6.00 to 6.50
No. 2 busheling	4.00 to 4.50
Locomotive tires, smooth	11.50 to 12.50
Pipes and flues	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast	9.50 to 10.00
No. 1 railroad cast	8.50 to 9.00
No. 1 agricultural cast	8.00 to 8.50
Stove plate	7.25 to 7.75
Grate bars	7.00 to 7.50
Brake shoes	7.75 to 8.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

	Base per Lb
Plates and structural shapes	3.00c
Soft steel bars	3.00c
Reinforcing bars, billet steel	3.00c
Rail steel reinforcement	1.50c. to 1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.35c
Flats and squares	3.85c
Bands, ⅞ to 6in Nos. 10 and 12 gages	3.10c
Hoops (No. 14 gage and lighter)	3.65c
Black sheets (No. 24)	3.80c
Galv. sheets (No. 24)	4.35c
Blue ann'l'd sheets (No. 10)	3.35c
Spikes (⅝ in. and larger)	3.45c
Track bolts	4.30c
Rivets, structural	4.00c
Rivets, boiler	4.00c
	Per Cent Off List
Machine bolts	60 and 10
Carriage bolts	60 and 10
Coach and lag screws	60 and 10
Hot-pressed nuts, sq., tap. or blank	60 and 10
Hot-pressed nuts, hex., tap. or blank	60 and 10
No. 8 black ann'l'd wire, per 100 lb.	$3.15
Com. wire nails, base per keg	2.50
Cement c'd nails, base per keg	2.50

CLEVELAND

District Steel Mills Now Averaging 70 Per Cent Ingot Output

CLEVELAND, March 17.—Demand for finished steel is holding to recent volume, although specifications do not show much tendency to expand outside of the motor car industry. Hot-rolled strip steel has shown greater gains than most other products, and is now moving better than for several months. There has been no further upward trend in sheet orders. Tin plate is in good demand. Specifications for wire rods have improved.

Operations of Cleveland steel plants were increased during the week by the starting up of three open-hearth furnaces. Twenty-four are now in service, bringing local operations up to 70 per cent of ingot capacity, the best since early in June last year. Two local plants are operating their open-hearths at 100 per cent.

The announcement of reestablishment of the present price on steel bars, plates and shapes at 1.65c., Pittsburgh, has been followed by the naming of this price by one other producer, who has also announced a 1.70c., Cleveland, price on steel bars. Several other mills have not yet come out with second quarter prices. Consumers are showing no interest in prices for the heavy hot-rolled steel products and little interest in sheet and strip contracts, although a few consumers of the latter products have closed contracts. While the prices that have been named on plates, shapes and bars have been quoted through the present quarter, nearly all consumers have been under contract at $1 a ton lower. If the announced advance is maintained, it is not expected to drive out a great deal of tonnage on expiring contracts because, with their present attitude, consumers will prefer to order steel as needed rather than to save $1 a ton by specifying in full against first quarter contracts. There is still considerable steel due against these contracts and some of the mills will accept specifications up to April 1.

Cleveland furnaces have reduced the price of foundry and malleable pig iron 50c. a ton for local delivery. Pig iron continues very quiet, orders showing little improvement outside of the motor car industry.

Pig Iron

Cleveland furnaces have announced a reduction of 50c. a ton to $17 on pig iron for local delivery. This was done presumably to narrow the spread between the price quoted for outside delivery and local delivery, this spread having recently amounted to $1.50 a ton. Prices for outside delivery are unchanged at $16 to $17, furnace. For Michigan delivery, $17 is now quoted, concessions of 50c. from the recent $17.50 price having become quite common. The pig iron melt in the Cleveland area has not improved to any extent except by the motor car industry. Small consumers are buying only in carload lots, while large consumers are not covering their requirements for more than 30 days. The aggregate of such small-lot business has been fairly good, but nevertheless the general tone of the market is dull.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$17.00
S'th'n fdy., sil. 1.75 to 2.25	$16.51 to 17.01
Malleable	17.50
Ohio silvery, 8 per cent	25.00
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; $2 from Jackson, Ohio; $6.01 from Birmingham.

Iron Ore

The Ford Motor Co. will receive bids March 25 against its recent inquiry for 265,000 tons of ore for its 1931 requirements. No other inquiries have come out, and consumers are showing little interest in prices for the season.

Wire Products

Orders for manufacturers' wire show a moderate increase. Jobbers are specifying fairly well. Some of the independent mills have followed the leading maker in announcing a $2 a ton price advance for the second quarter.

Bars, Plates and Shapes

Steel bars and structural shapes are moving fairly well in small lots, but plates continue dull. Not much structural inquiry is coming out. Cleveland placed 880 tons for two bridges and bids were taken for John Carroll University, requiring 730 tons. An order for 1000 tons of sheet piling for the Thunder Bay Quarries Co., Alpena, Mich., went to the Carnegie Steel Co. While inquiry for reinforcing bars has gained, the seasonal improvement is less than normal. The Huron Road Hospital, Cleveland, which will be a reinforced concrete building, will require 400 tons.

Sheets

The volume of sheet business within the past week has not been especially active. Orders are about holding their own, with no further gains reported. Some sheet producers are offering second quarter contracts at current price levels, but very few contracts have been closed. Meanwhile, the price situation on black sheets is somewhat uncertain owing to the fact that concessions to 2.25c. a lb. have been given in a few instances.

Strip Steel

There is considerable activity in hot-rolled strip steel, orders having increased to such an extent that two Ohio mills are now operating at 100 per cent of capacity. A few contracts for the second quarter have been closed at the recent advance of $1 a ton on hot-rolled and $2 a ton on cold-rolled, but the new prices have not had a real test as yet.

Old Material

Mills in Cleveland and in the Valley are taking restricted shipments of heavy melting steel on contracts, but there is no new buying. Prices are steady and unchanged.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$10.00 to $10.50
No. 2 heavy melting steel	9.75 to 10.00
Compressed sheet steel	9.25 to 9.50
Light bundled sheet stampings	7.50 to 7.75
Drop forge flashings	8.00 to 8.50
Machine shop turnings	4.75 to 5.25
Short shoveling turnings	7.00 to 7.25
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	10.00 to 10.50
No. 1 busheling	8.50 to 9.00
Pipes and flues	5.50 to 6.00
Steel axle turnings	9.50 to 10.00
Acid Open-Hearth Grades	
Low phos., billet bloom and slab crops	16.50 to 17.00
Blast Furnace Grades	
Cast iron borings	7.00 to 7.50
Mixed borings and short turnings	7.00 to 7.50
No. 2 busheling	6.25 to 6.50
Cupola Grades	
No. 1 cast	12.00 to 12.50
Railroad grate bars	6.00 to 6.50
Stove plate	6.00 to 6.50
Rails under 3 ft.	15.00 to 15.50
Miscellaneous	
Rails for rolling	15.00 to 15.50
Railroad malleable	12.50 to 13.00

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.85c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex	3.40c.
Cold-fin. flats and sq.	3.90c.
Hoops and bands, No. 12 to ¼ in., inclusive	3.10c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.60c.
Galvanized sheets (No. 24)	4.35c.
Blue ann'l'd sheets (No. 10)	3.10c.
No. 9 ann'l'd wire, per 100 lb.	$2.35
No. 9 galv. wire, per 100 lb.	2.80
Com. wire nails, base per keg	2.25

*Net base, including boxing and cutting to length.

Production of galvanized sheet metal ware in January totaled 103,677 doz. pails and tubs against 87,140 doz. last December, while the output of other galvanized sheet metal ware amounted to 23,716 doz., compared with 21,657 doz.

NEW YORK

125,000 Tons or More in Structural Steel Awards Imminent

NEW YORK, March 17.—Demand for pig iron is temporarily light, but shipments continue to show a slight increase. New inquiries are scarce. Sales, at 5500 tons, compare with 6500 tons in the previous week and 10,000 tons two weeks ago. Foundry operations are still highly irregular, and the outlook even for plants showing improvement is so uncertain that they hesitate to buy ahead. The Worthington Pump & Machinery Corpn. has closed for 325 tons of No. 1X for Harrison, N. J. The inquiry of the Crompton & Knowles Loom Works for 1000 tons for delivery at Providence, R. I., is still pending.

Prices are still sensitive, but may improve in tone as a result of the announcement of an advance on Alabama iron to $11, Birmingham, for Northern delivery. Meanwhile, eastern Pennsylvania iron is still available at $16, furnace, and Buffalo iron at $15, furnace, with silicon differentials frequently absorbed.

Witherbee Sherman & Co., Port Henry, N. Y., have resumed operations at their iron mines after a brief shutdown.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25 ..... $19.91 to $20.41

*Birmingham No. 2, del'd cast. N. J. ..... 18.28 to 18.78

East. Pa. No. 2 fdy., sil. 1.75 to 2.25 ..... 17.39 to 17.89

East. Pa. No. 2X fdy., sil. 2.25 to 2.75 ..... 17.89 to 18.39

Freight rates: $1.91 from Buffalo, $1.39 to $2.82 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $2.28 a ton from Buffalo.

Finished Steel

Structural steel contracts for the nine buildings to be erected by the Metropolitan Square Corpn., in "Radio City," New York, and which will call for a total variously estimated from 125,000 to 160,000 tons, are expected momentarily, if they have not already been tentatively awarded. Reports were current Tuesday that the orders had been informally given out.

Local steel sales offices report a continued gradual improvement in the number and aggregate volume of orders. Thus far in March many of the steel companies have booked from 10 to 20 per cent more tonnage in this district than in the same period of February. Last month showed approximately the same gain over January. The Delaware, Lackawanna & Western Railroad has placed an additional rail order for 4500 tons with the Bethlehem Steel Co.

The price situation is shaping up for the second quarter, but not many contracts have been closed thus far, chiefly because of the lack of interest among consumers, who still have considerable steel due them on first quarter contracts, on which most mills will permit specifications up to March 31. Although several of the larger producers of bars, shapes and plates have announced that 1.65c., Pittsburgh, will be the absolute minimum for all second quarter contracts, which is $1 a ton above the current quarter's contract price, a few mills are taking no action on prices, apparently preferring to await developments. Virtually all makers of wire products have announced a $2 a ton advance for the next quarter. Hot-rolled strip specifications against first quarter contracts have gained since the announcement of a $1 a ton advance for the coming quarter, but the new price has not yet had a real test. Occasional concessions of $1 a ton have appeared on black and galvanized sheets. Sheet producers will make no attempt to advance prices for the second quarter, several having announced to the trade that contracts will be accepted at current quotations.

Warehouse Business

Buying continues smaller than usual at this season, but prices are maintained despite keen competition from offerings of bars and shapes by importers, who are able to give immediate shipment from dock. The new quantity differentials adopted for these products are expected to aid jobbers in this district to compete on more favorable terms with foreign steel.

Cast Iron Pipe

The Department of Purchase, New York, opens bids Wednesday on about 3000 tons of 8 to 12-in. cement-lined water pipe for delivery in Brooklyn. Syracuse, N. Y., has closed on a small tonnage of water pipe, and Yarmouth, Mass., opens bids Wednesday on about 300 tons of 6 to 12-in. pipe. Prices are unchanged, with small concessions appearing on the larger tonnages of pipe.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $36.90 to $37.90; 4-in. and 5-in., $39.90 to $40.90; 3-in., $46.90 to $47.90. Class A and gas pipe, $3 extra.

Reinforcing Bars

Quotations by distributers continue at 1.65c. a lb., Pittsburgh, or 1.98c., New York, with tonnages occasionally offered for direct mill shipment at slight concessions. Among the larger tonnages of reinforcing bars in the market is about 2000 tons for the New York Central Railroad warehouse and freight terminal on Washington Street. About 500 tons of bars for the deck of the Hudson River bridge have been awarded.

Coke

Shipments of foundry coke are increasing slightly, if at all. Furnace coke prices range from $2.50 to $2.60 a net ton, Connellsville, and foundry coke quotations follow:

Special brands of beehive foundry coke, $4.70 to $4.85 a net ton, ovens, or $8.41 to $8.56, delivered to northern New Jersey, Jersey City and Newark, and $9.29 to $9.44 to New York and Brooklyn; by-product foundry coke, $9 to $9.40, Newark or Jersey City; $10.06, New York or Brooklyn.

Old Material

Prices being paid by brokers for No. 1 heavy melting steel show a range from $10, delivered to a Claymont, Del., consumer, or $6.50, New York, to $10.50, delivered Coatesville, Pa., or $6.75, New York, with $7.75, New York, being paid for barge shipment to a Bridgeport, Conn., user. Some tonnages of No. 1 steel have been bought by a Buffalo consumer for barge delivery from the New York district when canal navigation opens. An eastern Pennsylvania mill, which is receiving delivery of about 15,000 tons of heavy melting steel from the Seaboard Air Line, has closed on about 10,000 tons with a dealer at $11, delivered.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$6.50 to	$7.75
Heavy melting steel (yard)	5.00 to	5.25
No. 1 hvy. breakable cast	6.75 to	7.50
Stove plate (steel works)	4.75 to	5.00
Locomotive grate bars	4.75 to	5.00
Machine shop turnings		3.50
Short shoveling turnings		3.50
Cast borings (blast fur. or steel works)		3.50
Mixed borings and turnings		3.00
Steel car axles	13.00 to	13.50
Iron car axles	17.00 to	17.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)		7.25
Forge fire		7.00
No. 1 railroad wrought		8.75
No. 1 yard wrought, long		7.75
Rails for rolling	9.25 to	9.75
Stove plate (foundry)	5.50 to	6.00
Malleable cast (railroad)	9.00 to	9.50
Cast borings (chemical)	8.50 to	9.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.); cupola size	10.50
No. 2 cast (radiators, cast boilers, etc.)	10.00

Republic Steel Corpn. has sold a Canadian subsidiary, the Canadian Metal Products Co., Guelph, Ont., to the Burlington Steel Co., Ltd., Hamilton, Ont. The Guelph plant has ceased operations, and the purchaser will move the equipment to its plant at Hamilton.

Nitralloy Corpn., 52 Broadway, New York, has licensed the Bethlehem Steel Corpn. to use the Nitralloy patents in the manufacture of alloy steels.

PHILADELPHIA

Pennsylvania Railroad Inquires for 125,000 Tons of Steel

PHILADELPHIA, March 17.—The largest steel tonnage inquired for in some time is in the market for the Pennsylvania Railroad, which will open bids March 23 on more than 125,000 tons of structural steel and miscellaneous electrification material. Included in the inquiry are 37,000 tons of H columns, 8000 tons of steel cross beams and almost 20,000 tons of structural steel for a new main station, express facilities and a plaza at West Philadelphia. The Norfolk & Western Railroad is inquiring for 2500 tons of plates, shapes and bars.

General steel requirements in this district are unchanged. Prices are being maintained except for occasional $1 to $2 a ton concessions to preferential buyers of black and galvanized sheets. In an effort to establish 1.65c., Pittsburgh, as the contract basis for second quarter on plates, shapes and bars, mills are quoting this price more regularly on current business, but 1.60c. is still available on the more desirable orders.

Pig Iron

Most of the carload business in foundry pig iron is being placed at $17 a ton, but sellers have recently shown an inclination to waive the differential for silicon, offering No. 2X foundry at $17, furnace. Southern pig iron producers are beginning to adopt a firmer attitude on prices and are quoting $11 a ton on small lots, with $10.50 for desirable tonnages. An Eddystone, Pa., basic pig iron consumer has not yet closed on about 3000 tons for delivery over the rest of this year, and may increase its requirements slightly in placing the order. On about 225 tons of low phosphorus pig iron for the Navy Yard, Washington, the lowest bid submitted was on British iron.

Prices per gross ton at Philadelphia

East. Pa. No. 2, 1.75 to 2.25 sil.	$17.76 to $18.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	18.26 to 18.76
East. Pa. No. 1X	18.76 to 19.26
Basic (del'd east. Pa.)	17.25 to 17.50
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.61 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Steel Bars

On the small lots of bars being bought at present, mills are generally quoting 1.65c., Pittsburgh, or 1.94c., delivered Philadelphia, but concessions are still granted on the more substantial tonnages to 1.60c., Pittsburgh, or 1.89c., Philadelphia. Billet steel reinforcing bars are at 1.65c., Pittsburgh, or 1.94c., Philadelphia, and rail steel bars are about 1.35c., Pittsburgh, or 1.64c., Philadelphia. Current reinforced concrete projects include 550 tons in a Reading, Pa., highway bridge and 325 tons in a section of the Market Street subway, Philadelphia.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¾-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
†Galvanized sheets (No. 24)	4.15c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'l'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.35c. base; 1 to 9 bun., 5.30c. base.

Shapes

Quotations are generally at 1.70c. a lb., f.o.b. nearest mill to consumer, or 1.76c., Philadelphia, with small and miscellaneous specifications bringing 1.75c., f.o.b. mill, or 1.81c., Philadelphia. Except for the inquiry of the Pennsylvania Railroad for more than 125,000 tons of steel, most of which is structural shapes, only a small tonnage of new business is in the market. The Pennsylvania inquiry includes a new main station, 13,000 tons; a plaza, 2500 tons, and railroad express facilities, 3700 tons, all in West Philadelphia. There are also a passenger station and concourse and bridges in Newark, a bridge over the Passaic River, three bridges over the Hackensack River, a bridge at Trenton, N. J., and one on the Shellport branch.

Plates

Inquiry for plates has shown a slight improvement in the past week, but the actual tonnages on mill order books have not increased enough to justify an advance in operating rates. On small miscellaneous tonnages, 1.75c., Coatesville, Pa., or 1.85½c., Philadelphia, is being quoted, but on desirable business 1.70c., Coatesville, or 1.80½c., Philadelphia, usually applies.

Sheets

On a recent purchase of about 135 tons of galvanized sheets by a local consumer, the buyer is understood to have been quoted the current market price for delivery of the material into November, although most sellers asked an advance of 10c. a 100 lb. for the part of the tonnage to be shipped in the third quarter. The current price on galvanized sheets of 2.90c. a lb., Pittsburgh, or 3.19c., Philadelphia, is occasionally shaded $1 to $2 a ton on business with distributers and large manufacturing consumers. A similar situation prevails in black sheets. Blue annealed sheets, No. 13 gage, are quoted at 2.05c., Pittsburgh, or 2.34c., Philadelphia, and blue annealed plates, No. 10 gage, are 1.90c., Pittsburgh, or 2.19c., Philadelphia. Concessions from these prices are usually granted on the widths with which the product of the continuous mill competes. Should the local locomotive builder receive part of the order for 90 locomotives for the Pennsylvania Railroad, some substantial sheet business will be placed. These locomotives will require heavy gages of blue annealed and about 2300 tons of electrical sheets.

Imports

In the week ended March 14, arrivals at this port consisted of 198 tons of chrome ore from British India, 29 tons of ferrochrome from Switzerland, 743 tons of pig iron from the United Kingdom, and 25 tons of bearing tubes and 9 tons of bearing bars from Sweden.

Old Material

Prices of all grades of scrap are generally unchanged. While there is no shortage of No. 1 heavy melting steel, especially with mills asking delays in further deliveries on contracts, opening of navigation on the barge canal in a few weeks is expected to draw a considerable tonnage of No. 1 steel from the New York district to Buffalo.

Prices per gross ton delivered consumers' yards, Philadelphia district.

No. 1 heavy melting steel	$10.00 to $11.00
No. 2 heavy melting steel	9.00
Heavy melting steel (yard)	8.50
No. 1 railroad wrought	11.50 to 12.00
Bundled sheets (for steel works)	9.00
Hydraulic compressed, new	9.00 to 10.00
Hydraulic compressed, old	8.00 to 8.50
Machine shop turnings (for steel works)	7.50
Heavy axle turnings (for equiv.)	9.50 to 10.00
Cast borings (for steel works and roll. mill)	7.50
Heavy breakable cast (for steel works)	11.00
Railroad grate bars	9.00
Stove plate (for steel works)	9.00
No. 1 low phos., hvy., 0.04% and under	17.00 to 18.00
Couplers and knuckles	15.50 to 16.00
Rolled steel wheels	15.50 to 16.00
No. 1 blast f'nace scrap	6.00 to 6.50
Wrot. iron and soft steel pipes and tubes (new specific.)	11.50 to 12.00
Shafting	18.00
Steel axles	17.50 to 18.00
No. 1 forge fire	11.00
Cast iron carwheels	13.50 to 14.00
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	12.50 to 13.00

ST. LOUIS

Southern Pig Iron Advanced 50c. a Ton—Scrap Prices Go Lower

ST. LOUIS, March 17.—A leading Southern maker of pig iron advanced its price 50c. a ton, as had been expected for several weeks, to $11, f.o.b. Birmingham, and it is believed that other makers in that section will take similar action shortly, if they have not already done so. The St. Louis Gas & Coke Corpn. is still quoting $17.50, f.o.b. Granite City, and the market is strong. About 1000 tons of Southern iron and 1000 tons of the local product constituted the week's business, which was in lots of a carload up to 300 tons, conservatism still marking the commitments of melters. Users of basic iron in the district are expected to come into the market within the next week or 10 days for their second quarter requirements.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	$14.92 to 15.42
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: 75c. (averaged Granite City to St. Louis), $2.16 from Chicago; $1.42 from Birmingham.

Finished Steel

Business in plates, shapes and bars during the week was smaller in volume than for some time and not up to expectations based on purchases in other sections. Tin plate continues active, and the movement of galvanized sheets has been fair. Building operations are very light, the only project of note being an addition to the erecting shop of an engine company, which will require 400 tons of structural steel. Demand for reinforcing bars is small.

Old Material

Selected heavy melting steel, wrought iron bars and transoms, No. 1 railroad wrought, steel rails, less than 3 feet, and No. 1 railroad cast are 50c. a ton lower.

Railroad lists: Chicago, Burlington & Quincy, 3705 tons; Missouri-Kansas-Texas, 3300 tons; Wabash, 1095 tons; International Great Northern, 500 tons; Chicago & Alton, 790 tons; St. Louis-San Francisco and Milwaukee Road, 23 carloads each; Pullman Co., 6 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	$10.00 to $10.50
No. 1 heavy melting or shoveling steel	9.00 to 9.50
No. 2 heavy melting or shoveling steel	8.25 to 8.75
No. 1 locomotive tires	10.75 to 11.00
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	9.50 to 10.00
Railroad springs	12.50 to 13.00
Bundled sheets	6.50 to 7.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 busheling	6.50 to 7.00
Cast iron borings and shoveling turnings	6.00 to 6.50
Iron rails	8.00 to 8.50
Rails for rolling	10.75 to 11.25
Machine shop turnings	3.00 to 3.50
Heavy turnings	7.00 to 7.50
Steel car axles	14.50 to 15.00
Iron car axles	20.00 to 20.50
Wrot. iron bars and trans.	10.00 to 10.50
No. 1 railroad wrought	9.00 to 9.50
Steel rails, less than 3 ft.	12.50 to 13.00
Steel angle bars	9.50 to 10.00
Cast iron carwheels	9.75 to 10.25
No. 1 machinery cast	9.50 to 10.00
Railroad malleable	10.00 to 10.50
No. 1 railroad cast	9.00 to 9.50
Stove plate	7.50 to 8.00
Relay. rails, 60 lb. and under	16.00 to 16.50
Relay. rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	9.50 to 10.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	2.25c.
Bars, soft steel or iron	2.15c.
Cold-fin. rounds, shaftings, screw stock	2.60c.
Black sheets (No. 24)	3.05c.
Galv. sheets (No. 24)	4.00c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.10c.
Galv. corrug. sheets	4.65c.
Structural rivets	4.15c.
Boiler rivets	4.15c.

	Per Cent Off List
Tank rivets, ⅞-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60 and 10
Carriage bolts	60 and 10
Lag screws	60 and 10
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10

BOSTON

Pig Iron Buying Slow—Alabama Furnaces Now Asking $11, Birmingham

BOSTON, March 17.—Pig iron sales the past week were not much more than 1000 tons, with Buffalo furnaces the most active. One Buffalo stack is holding to $16 a ton, furnace, for No. 2X, but two others are soliciting business at $15.50. Alabama furnaces heretofore offering iron at $10.50 a ton, base furnace, now quote $11. Foundries are specifying against contracts a little more freely and report a slight improvement in business, but translated into pig iron consumption it does not amount to much. Freer specifications are due largely to the fact that foundries have taken practically no iron for a month or longer. The Crompton & Knowles Loom Works, Worcester, Mass., has yet to cover on its 1000-ton inquiry. A Springfield, Mass., melter, which sounded out the market on 1000 tons of iron, now says it will not purchase until May.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	$19.91 to $20.91
†Buffalo, sil. 2.25 to 2.75	19.91 to 20.91
*Ala., sil. 1.75 to 2.25	20.11 to 20.61
*Ala., sil. 2.25 to 2.75	20.61 to 21.11
†Ala., sil. 1.75 to 2.25	16.75
†Ala., sil. 2.25 to 2.75	17.25

Freight rates: $4.91 all rail from Buffalo; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Cast Iron Pipe

Springfield, Mass., has awarded 533 tons of 4 to 12-in. pipe to the United States Pipe & Foundry Co.; Bedford, Mass., 120 tons of 6-in. to the Donaldson Iron Co., and Wilmington, Mass., 100 tons of 10-in. to the Warren Foundry & Pipe Co. Greenfield, Mass., will close bids this week on 8000 ft. of 6, 8 and 12-in. pipe.

Warehouse Business

The American Steel & Wire Co. has advanced wire nails 10c. a keg, but warehouses have not as yet marked up their prices.

Reinforcing Steel

Billet steel bar sales the past week did not exceed 600 tons and included 275 tons for a Chicopee, Mass., job and 145 tons for a Massachusetts Institute of Technology unit. Despite limited buying, prices are steady at 3c. a lb., base, for 1 to 5-ton lots from stock, 2.40c. for 6 to 99-ton lots, and 2.30c. for 100-ton and larger lots. Massachusetts is taking bids for road work; a moderate tonnage of rail steel bars is involved.

Old Material

The American Steel & Wire Co., Worcester, Mass., continues to purchase bundled skeleton at $8.50 a ton, delivered, for which brokers are paying $6.10 a ton, on cars shipping point. Moderate tonnages of No. 1 heavy melting steel have been going to Weirton, W. Va. Aside from these orders, the old material market is lifeless, although occasionally a car of breakable cast at $6.50 a ton, on cars, is moved. Prices are unchanged.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$6.75 to $7.50
Scrap T rails	6.50 to 7.00
Scrap girder rails	5.50 to 6.00
No. 1 railroad wrought	7.00 to 7.50
Machine shop turnings	2.00 to 2.50
Cast iron borings (steel works and rolling mill)	2.00 to 2.50
Bundled skeleton, long	6.00 to 6.10
Forge flashings	5.60 to 6.10
Blast furnace borings and turnings	2.00 to 2.50
Forge scrap	5.10 to 5.60
Shafting	13.00 to 13.50
Steel car axles	14.00 to 15.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	6.50 to 7.00
Rails for rolling	8.50 to 9.00
Cast iron borings, chemical	9.00 to 9.50
No. 2 cast	5.10 to 5.60

Prices per gross ton deliv'd consumers' yards:

Textile cast	$9.00 to $9.50
No. 1 machinery cast	10.50 to 11.00
Stove plate	7.00 to 7.25
Railroad malleable	13.00 to 13.50

Sales of mechanical refrigerators in 1929 amounted to $161,334,000, according to the Bureau of the Census.

BIRMINGHAM

Pig Iron Sales at $12 to $13 a Ton—Steel Business Steady

BIRMINGHAM, March 17.—New pig iron tonnage consists mostly of small routine business. No second quarter buying of consequence has been done. Quotations for small lots are generally around $13, but attractive business is being booked at $12 to $12.50. March shipments are at a better rate than those of February and are exceeding production.

The Republic Steel Corpn. fired its No. 1 furnace on Saturday and is now operating two stacks. This furnace went out the middle of February for repairs and was replaced at that time by No. 2 furnace. Both are expected to continue in operation for some time. This increases the number of active stocks in Alabama to 12.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00 to $13.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50 to 13.50
Basic	12.00 to 13.00

Finished Steel

The steel situation has changed little within the past few weeks. Bars and structural shapes are the most active products. Plate tonnage has been off, but last week there were several inquiries that give promise of some good business within the near future. Operations of the Tennessee company are at about 70 per cent, according to a statement made a few days ago. Fabricators of structural steel and reinforcing bars report their markets as more or less spotty, with current business in small amounts. The Nashville Bridge Co. has secured 360 tons of structural steel from the Memphis Power & Light Co. for two power line towers across the Mississippi River. Prices are unchanged.

The Tennessee company operated 12 open-hearths last week, compared with 13 the preceding week. Gulf States Steel continues with three.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.36½c.
Structural shapes—	
Angles and beams	3.36½c.
Tees	3.36½c.
Zees	3.36½c.
Soft steel bars, small shapes	3.36½c.
Reinforcing bars	3.11½c. to 3.36½c.
Iron bars—	
Refined	3.36½c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.80c.

	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts	60 and 5
Cold-punched nuts	60 and 5
Stove bolts	70 and 10

Cast Iron Pipe

The pipe movement continues slow and below expectations. Small orders are building up a fair accumulation, and plant operations are steady. Chicago has placed 5000 to 6000 tons with Birmingham plants. The American Cast Iron Pipe Co. reports new business amounting to more than 6000 tons, the Philippines having taken about 3400 tons of this. Quotations have now been formally lowered to $35 to $36, which are in line with recent concessions.

Old Material

There was some buying of steel grades and stove plate last week; also larger takings on contracts. However, business fluctuates from week to week, with very little gain. No changes have been made in prices.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$10.50 to $11.00
Scrap steel rails	10.50
Short shoveling turnings	9.00
Cast iron borings	8.50
Stove plate	8.50
Steel axles	19.00
Iron axles	18.00
No. 1 railroad wrought	10.00
Rails for rolling	11.50 to 12.00
No. 1 cast	11.00
Tramcar wheels	11.00 to 11.25
Cast iron borings, chem.	13.50
Cast iron carwheels	11.00

PACIFIC COAST

Hoover Dam Contract Awarded—30,000 Tons for Pipe Line

SAN FRANCISCO, March 14.—(*By Air Mail.*)—The general construction contract for the Hoover dam in Colorado, which will require about 50,000 tons of plates, shapes, pipe, sheet piling and other steel products, has been awarded to the Six Companies, Inc., San Francisco. Another award of outstanding interest involved 30,000 tons of pipe for a gas line in southern California. This award was made by the Southern Fuel Co., Los Angeles, which a week ago placed 20,000 tons of electrically welded steel pipe with the A. O. Smith Corpn., Milwaukee. The additional 30,000 tons, making a total of 50,000 tons for this pipe line, was divided between the A. O. Smith Corpn. and the Western Pipe & Steel Co. The former will furnish 53 miles of 26-in. pipe, about 12,000 tons, and the latter 76 miles of the same diameter, involving about 18,000 tons.

Further pipe business is in prospect. Bids have been opened on 4500 tons of 24 to 36-in. welded steel pipe of ⅜ and 7/16-in. material for Los Angeles. The Steel Tank & Pipe Co. is low bidder on 210 tons of 20-in. welded steel pipe for the East Bay Municipal Utility District, Oakland.

Aside from these orders and prospective orders, the demand for steel products shows very little improvement. There are no changes in prices.

Bars

Merchant bar steel is in light demand, and bookings so far this year have not been heavy. Prices continue to hold around 2.10c., c.i.f. Only two awards of reinforcing steel bars of 100 tons or more are reported. Unnamed interests secured 100 tons for a school auditorium in Sawtelle, Cal., and 100 tons for the Bell Street bridge in Seattle. Bids have been opened on 200 tons for paving work in Imperial County, Cal. Prices in the San Francisco district range from 2.40c. to 2.50c., base, on carload lots

Pig iron prices per gross ton at San Francisco:

*Utah basic	$22.00 to $24.00
*Utah fdy., sil 2.75 to 3.25	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25	22.00 to 24.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco

out of stock, while Los Angeles quotations appear firm at 2.50c., base.

Shapes

Only three structural awards in excess of 100 tons were noted. The Consolidated Steel Corpn. secured 250 tons for ring gates for the Government at Denver. In addition, the Pacific Iron & Steel Co. took 150 tons and 240 tons respectively for radio towers and a bridge, both in Los Angeles. New inquiries include 300 tons for the Islais Creek bridge and 320 tons for Pier 15, both in San Francisco. Bids have been opened on 111 tons for a bridge in Ventura County, Cal., and bids will be opened April 1 on 525 tons for a bridge over the Santa Fe tracks near Merced, Cal. Plain material ranges from 2.05c. to 2.15c., c.i.f.

Cast Iron Pipe

Demand continues active. Several large-sized lots were placed. The American Cast Iron Pipe Co. took 515 tons of 24-in. Class B pipe for Vallejo, Cal. Yakima, Wash., placed 350 tons of 12 and 16-in. Class B pipe

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	2.50c.
Soft steel bars	2.50c.
Black sheets (No. 24)	3.15c.
Blue ann'l'd sheets (No. 10)	3.05c.
Galv. sheets (No. 24)	4.05c.
Struc. rivets, ½-in. and larger	3.00c.
Com. wire nails, base per keg	$3.35
Cement c'd nails, 100 lb. keg	3.75

with the same concern and 45 tons of 2 to 8-in. pipe with the Pacific States Cast Iron Pipe Co. Vancouver, B. C., awarded 1681 tons as follows: to Gordon & Belyea, 471 tons of 6 and 8-in. Class D; to Pacific Water Works Supply Co., 530 tons of 6 and 8-in. Class C; and to Evans, Coleman & Evans, 680 tons of 6 and 8-in. Classes C and 150 pipe. The United States Pipe & Foundry Co. was low bidder on 787 tons of 4 to 24-in. Classes B and C pipe for Bellingham, Wash. Bids will be opened March 25 on 136 tons of 4 to 10-in. Class 150 pipe for the National Guard Training Camp in San Luis Obispo, Cal.

Youngstown

Operations Maintained at 50 Per Cent of Capacity

YOUNGSTOWN, March 17.—For the third week in March the steel industry of this district is operating at fully 50 per cent of capacity. Automobile releases are coming to hand in sufficient volume to enable sheet and strip makers to build up backlogs.

Operations of steel companies vary considerably, but in most cases there have been increases during the past week. The Republic Steel Corpn. is averaging 58 per cent, with an expansion in store for its Canton-Massillon properties, due to broader demands from the automotive trade for alloy steels. The Youngstown Sheet & Tube Co. is operating at 40 per cent, the Carnegie Steel Co. at 50 per cent, and the Sharon Steel Hoop Co. at 60 per cent. The Newton Steel Co. is operating its Newton Falls plant at 70 per cent and will soon be utilizing its mill at Monroe, Mich.

The Shenango Furnace Co. is again operating a blast furnace and its ingot mold plant at Farrell, Pa., after an idleness of three months. Orders on the company's books are sufficient to sustain production for a considerable period. This blast furnace resumption gives the district 12 active furnaces out of 34, the highest schedule since last fall.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.35c.
Cold-fin. rounds and hex.	3.80c.
Squares	4.30c.
Black sheets (No. 24)	3.50c.
Galvanized sheets (No. 24)	4.40c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (25 kegs or more)	2.85
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

CINCINNATI

Pig Iron Demand Lessens—Sheet Steel Orders Continue to Gain

CINCINNATI, March 17.—Interest in pig iron purchases appears to have lessened in the past week, presumably because melters' nearby needs are covered. The week's orders totaled about 1700 tons, mostly in lots of 100 tons or less. Although foundries report a slight increase in business, they are working off present stocks of raw materials and are not anticipating their requirements beyond the business already in hand. The only important inquiry is for 500 to 1000 tons of malleable iron for a Michigan melter. Alabama furnaces have announced a minimum of $11, Birmingham, on foundry iron for shipment to this district.

Prices per gross ton, deliv'd Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$14.19 to $14.69
Ala. fdy., sil. 2.25 to 2.75	14.69 to 15.19
Tenn. fdy., sil. 1.75 to 2.25	14.19 to 14.69
S'th'n Ohio silvery, 8 per cent	24.39

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Steel

Sheet mills in this district report that the slow upturn in demand for sheets has continued during the past week. Operations of mills are at 60 per cent, and in one or two instances slightly above this figure. The price of automobile body sheets has been reduced to 3.20c. a lb., and slight weakness is reported on black sheets.

Old Material

New scrap business is almost negligible, although mills are taking in material against old contracts. Dealers' offering prices are unchanged.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$9.50 to $10.00
Scrap rails for melting	10.50 to 11.00
Loose sheet clippings	5.50 to 6.00
Bundled sheets	8.75 to 9.25
Cast iron borings	4.50 to 5.00
Machine shop turnings	5.00 to 5.50
No. 1 busheling	8.00 to 8.50
No. 2 busheling	4.50 to 5.00
Rails for rolling	11.50 to 12.00
No. 1 locomotive tires	10.00 to 10.50
No. 2 railroad wrought	9.50 to 10.00
Short rails	14.25 to 14.75
Cast iron carwheels	10.50 to 11.00
No. 1 machinery cast	14.00 to 14.50
No. 1 railroad cast	12.00 to 12.50
Burnt cast	6.50 to 7.00
Stove plate	6.50 to 7.00
Brake shoes	6.50 to 7.00
Agricultural malleable	11.00 to 11.50
Railroad malleable	12.00 to 12.50

CANADA

Pig Iron Sales Expanding—Structural Steel Outlook Improving

TORONTO, March 17.—Sales of merchant pig iron are expanding. While business has not yet reached large volume, a steady demand for small lots is reported by local blast furnace representatives. Orders range from a single car to 500 tons. Most melters are adhering to the hand-to-mouth method of buying, although inquiries are increasing. Producers have opened their books for second quarter. Prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	20.50

Structural Steel

Structural steel awards are growing in number and total volume. Sales for the week ranged up to 1000 tons in individual lots, while prospective business includes requirements up to 3000 tons. About 30,000 tons is pending for closing within the next month or six weeks. Most of the prospective business is for bridge construction, although there is a better demand developing for building jobs.

Old Material

While the demand for machinery cast was well sustained for the week, other lines of scrap moved in a listless manner. Inquiries are out for machinery cast for delivery to the end of July, and spot sales are increasing in number and tonnage. Malleable scrap is also showing improvement, but stove plate is slow. Steel grades are holding to small tonnage lots on new order account and there is no future buying by mills. Montreal dealers report very little demand either for domestic consumption or export in steel grades, while iron grades are picking up gradually. Dealers are purchasing machinery cast and some malleable scrap, but otherwise are showing little or no interest in the market. Prices are unchanged.

Dealers' buying prices for old material.

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	....	10.00
Stove plate	....	8.00
Standard carwheels	....	8.50
Malleable	....	8.00
Per Net Ton		
No. 1 mach'ry cast	11.00	....
Stove plate	9.00	....
Standard carwheels	10.00	....
Malleable scrap	9.00	....

BUFFALO

Steel Mill Operations Unchanged—Pig Iron Orders Mostly Small

BUFFALO, March 17.—The pig iron market lacks large inquiries. Furnaces report a steady run of carload orders, with aggregate sales for the week around 3500 tons. Foundry operations are spotty, but the trend is slightly upward.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$17.50
No. 2X fdy., sil. 2.25 to 2.75	18.00
No. 1 fdy., sil. 2.75 to 3.25	19.00
Malleable, sil. up to 2.25	18.00
Basic	17.50
Lake Superior charcoal	27.28

Finished Steel

Operations of steel mills in this district continue at the same rate as last week. The Lackawanna plant of the Bethlehem Steel Co. is operating 15 open-hearths, Donner plant of the Republic Steel Corpn., two, Wickwire Spencer, two, and Gould Coupler, one. The new Colgate Divinity School which will be erected at Rochester will require 500 tons of structural steel.

Old Material

Dealers are paying $11 a ton for No. 1 heavy melting steel, and heavy railroad scrap has brought over $11 in the district.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$11.00 to $11.50
No. 2 heavy melting scrap	9.50 to 10.00
Scrap rails	11.00
Hydraul. comp. sheets	9.50 to 10.00
Hand bundled sheets	8.00 to 8.50
Drop forge flashings	9.50 to 10.00
No. 1 busheling	9.50 to 10.00

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.15c.
Reinforcing bars	2.85c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.60c.
Bands	3.50c.
Hoops	3.90c.
Blue ann'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.60
Black wire, base per 100 lb.	3.20

Hvy. steel axle turnings	10.50 to	11.00
Machine shop turnings	5.50 to	6.00
No. 1 railroad wrought	9.00 to	9.50
Acid Open-Hearth Grades:		
Knuckles and couplers	13.50 to	14.00
Coil and leaf springs	13.50 to	14.00
Rolled steel wheels	13.50 to	14.00
Low phos. billet and bloom ends	15.00 to	15.50
Electric Furnace Grades:		
Short shov. steel turnings	8.50 to	9.00
Blast Furnace Grades:		
Short mixed borings and turnings	7.00 to	7.25
Cast iron borings	7.00 to	7.25
No. 2 busheling		6.00
Rolling Mill Grades:		
Steel car axles	15.00 to	15.50
Iron axles	16.00 to	16.50
Cupola Grades:		
No. 1 machinery cast	11.00 to	11.50
Stove plate	10.00 to	10.50
Locomotive grate bars	8.25 to	9.25
Steel rails, 3 ft. and under	15.00 to	15.50
Cast iron carwheels	13.00 to	13.50
Malleable Grades:		
Industrial	11.00 to	12.00
Railroad	11.00 to	12.00
Agricultural	11.00 to	12.00
Special Grades:		
Chemical borings	9.50 to	10.00

Hoover Dam Contract Let to San Francisco Company

WASHINGTON, March 17.—Bids for steel and machinery requirements for the Hoover (Boulder) dam will be asked directly from the Denver office of the Bureau of Reclamation, Department of the Interior, 1441 Welton Street. The bureau here is not informed as to when these bids will be asked, but previously indicated that it would be some time in June. Since the general contract for building the dam was awarded last week to the Six Companies, Inc., San Francisco, it is assumed that the Denver office soon will be able to state definitely when it will invite bids on materials for the project. The successful general contract price was $48,890,995.

As stated in THE IRON AGE of Oct. 30, 1930, page 1257, construction of the dam will entail approximately 48,690 gross tons of steel. Among the estimates are: Reinforcing bars, 8382 tons; structural steel, 4026 tons; 6-ft., 9-in. cast iron pipe lining, 4288 tons; steel penstocks, 6300 tons; steel pipe, 3360 tons; pumping and piping, 5865 tons; miscellaneous metal work, 7702 tons; high pressure gates, 5536 tons; balanced needle valves, 1964 tons, and cylinder gates, 1267 tons.

The cost of machinery and equipment is estimated at about $17,700,000. Plans provide for a 1,000,000-hp. installation with 12 85,000-hp. hydraulic turbines, 12 11 x 10-ft. balanced valves, 12 75,000-kv-amp. generators, with exciters, 36 25,000-kv-amp. 220,000-volt transformers, four 250-ton cranes, switchboard and control apparatus, completely equipped machine shop.

President Raises Tariff on Some Wire Products

WASHINGTON, March 17.—President Hoover yesterday proclaimed an increase from 50 to 75 per cent ad valorem in the duty on fourdrinier wires, cylinder wires and woven wire cloth. The increase was made upon recommendation of the Tariff Commission. Germany was found to be the principal competing country and the increase was held to be necessary to equalize the differences in cost of production in Germany and the United States. The increase covers cylinder wires, having more than 55 meshes per lineal inch in warp or filling and fourdrinier wire, suitable for use in paper-making machines (whether or not parts of or fitted or attached to such machines); and woven wire cloth, having more than 55 meshes per lineal inch in warp or filling, suitable for use in the manufacture of fourdrinier wires or cylinder wires. The commission made no finding with respect to cylinder wires or woven wire cloth having not more than 55 meshes per lineal inch in warp or filling.

The report was made on an investigation begun on July 11, 1930, in compliance with a Senate resolution. Changes in duties become effective 30 days after proclamation by the President.

Residential Building Improves

A turn for the better has been made by residential building, according to February figures of F. W. Dodge Corpn. Downhill for more than two years, this type, looked to by economists as the construction class to indicate a forward movement after depression, has shown the first turn with its February record. This first reversal since 1928 is found in a total of $77,917,800 in residential contracts awarded during the month in the 37 States east of the Rocky Mountains.

A nearly equal division is made by the three major construction totals this month, a grand total of $235,405,100 being broken into the $77,917,800 already mentioned as residential; $78,844,500 for non-residential; and $78,642,800 for public works and utilities.

For the two months of the current year residential building was off only $9,000,000, compared with the same period of 1930. This loss of about 6 per cent compares with a loss of almost 50 per cent for the like two months of 1930 in contrast with 1929, indicating that the deflation in this type of building has been largely completed.

Steel Barrel Output Rose in January

WASHINGTON, March 17.—The output of steel barrels in January rose to 424,184 units, representing 31.2 per cent of capacity, against 412,283 barrels or 30.3 per cent of capacity last December, according to reports received by the Bureau of the Census from 27 establishments operating 32 plants.

Unfilled orders at the end of January for delivery within 30 days totaled 210,416 bbl., compared with 188,902 at the end of December. Unfilled orders at the end of January for delivery beyond 30 days totaled 1,214,029 bbl., against 1,248,171 at the end of December.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 6-in. and under 10-in., Pittsburgh	$30.00
Rerolling, 4-in. and under 10-in., Youngstown	30.00
Rerolling, 4-in. and under 10-in., Cleveland	30.00
Rerolling, 4-in. and under 10-in., Chicago	32.00
Forging quality, Pittsburgh	36.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$30.00
Youngstown	30.00
Cleveland	30.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$30.00
Youngstown	30.00
Cleveland	30.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.6c.
Universal	1.8c.
Sheared	1.6c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00 to $37.00
Cleveland	35.00 to 37.00
Chicago	35.00 to 37.00

Prices of Raw Material

Ores

(Delivered Cleveland, Ohio, Delivered Eastern Lake Ports)

	Per Gross Ton
Old ranges Bessemer, 51.50% iron	$4.80
Old ranges non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

(Furnace Ores f.o.b. Philadelphia or Baltimore)

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron, in dry Spanish or Algeria	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, averages 65% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	$12.00 to $12.25

	Per Gross Ton
Chrome ore, 45% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$20.00
Chrome ore, 48% Cr_2O_3 crude, c.i.f. Atlantic seaboard	22.50

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.50
Foundry, f.o.b. Connellsville prompt	$3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.10
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b. ovens	8.00
Foundry, by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.35 to $1.50
Mine run coking coal, f.o.b. W. Pa.	1.40 to 1.50
Gas coal, ¾-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.65 to .75
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.15

Ferromangnaese

	Per Gross Ton
Domestic, 80%, seaboard	$80.00 to $85.00
Foreign, 80%, Atlantic or Gulf port, duty paid	80.00 to 85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$28.00 to $30.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$82.50
75%	120.00

	Per Gross Ton Furnace		Per Gross Ton Furnace
10%	$25.00	12%	$29.00
11%	26.00	14%	31.00
12%	27.00	15%	33.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton
10% $22.00	13%	$29.00
11% 26.00	14%	31.00
12% 27.00	15%	33.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton
6% $21.00	11%	$24.00
7% 21.50	12%	25.00
8% 22.00	13%	27.00
9% 22.50	14%	29.00
10% 23.00	15%	31.00

Delivered prices at Chicago are about 50c. a ton below this schedule.

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd, carloads	$1.05
Ferrotungsten, less carloads	$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr_2 per lb. contained Cr. delivered, in carloads	11.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	24.50c. to 26.00c.
Ferrochromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	122.50
Silico-manganese, gross ton, delivered	135.00

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$14.00 to $14.50
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

Per 1000 f.o.b. Works

	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$40.00 to $43.00	$32.00 to $35.00
Maryland	40.00 to 43.00	32.00 to 35.00
New Jersey	40.00 to 43.00	.....
Ohio	40.00 to 43.00	32.00 to 35.00
Kentucky	40.00 to 43.00	32.00 to 35.00
Missouri	40.00 to 43.00	32.00 to 35.00
Illinois	40.00 to 43.00	32.00 to 35.00
Ground fire clay, per ton	6.50	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago	49.00
Birmingham	47.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
(Machine bolts	70
(Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

(Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	75
Semi-finished hexagon castellated nuts, S.A.E.	75
Stove bolts in packages, Pgh.	80, 10, 10 and 5
Stove bolts in packages, Chicago	80, 10, 10 and 5
Stove bolts in packages, Cleveland	80, 10, 10 and 5
Stove bolts in bulk, Pgh.	80, 10, 10, 5 and 2½
Stove bolts in bulk, Chicago	80, 10, 10, 5 and 2½
Stove bolts in bulk, Cleveland	80, 10, 10, 5 and 2½
Tire bolts	60, 10 and 10

Discounts of 12 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(⅝-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.75
F.o.b. Chicago	2.85

Small Rivets

(⅞-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

▲▲▲ Mill Prices of Finished Iron and Steel Products ▲▲▲

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.75c.
Del'd Philadelphia	1.94c.
Del'd New York	1.93c.
F.o.b. Cleveland	1.65c. to 1.70c.
F.o.b. Lackawanna	1.75c.
F.o.b. Birmingham	1.80c.
C.i.f. Pacific ports	2.25c.
F.o.b. San Francisco mills	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.75c.
F.o.b. Birmingham, mill lengths	1.75c. to 1.80c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.50c. to 1.55c.
F.o.b. Chicago Heights mill	1.60c. to 1.65c.
Del'd Philadelphia	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago	1.70c. to 1.75c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.75c.
F.o.b. Birmingham	1.80c.
Del'd Cleveland	1.78½c. to 1.83½c.
Del'd Philadelphia	1.85½c.
F.o.b. Coatesville	1.75c.
F.o.b. Sparrows Point	1.75c.
F.o.b. Lackawanna	1.75c.
Del'd New York	1.93½c.
C.i.f. Pacific ports	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.75c.
F.o.b. Birmingham	1.80c.
F.o.b. Lackawanna	1.75c.
F.o.b. Bethlehem	1.75c.
Del'd Cleveland	1.78½c. to 1.83½c.
Del'd Philadelphia	1.76c.
Del'd New York	1.90½c.
C.i.f. Pacific ports	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.65c. to 1.70c.
Wider than 6 in., P'gh	1.65c. to 1.60c.
6 in. and narrower, Chicago	1.75c. to 1.80c.
Wider than 6 in., Chicago	1.65c. to 1.70c.
Cooperage stock, P'gh	1.90c.
Cooperage stock, Chicago	2.00c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	*2.45c. to 3.40c.
Strips, P'gh	2.25c. to 2.35c.
Strips, Cleveland	2.25c. to 2.35c.
Strips, deliv'd Chicago	2.53c. to 2.63c.
Strips, Worcester	2.50c. to 2.60c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.10c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

	Base per Lb.
Bright wire	2.20c. to 2.30c.
Spring wire	3.20c. to 3.30c.

To Jobbing Trade

	Base per Lb.
Smooth annealed wire	2.35c. to 2.45c.
Smooth galvanized wire	2.80c. to 2.90c.
Polished staples	2.35c. to 2.45c.
Galvanized staples	2.60c. to 2.70c.
Barbed wire, galvanized	2.55c. to 2.65c.
Woven wire fence, per net ton	$60.00

	Base per Keg
Standard wire nails	$1.90 to $2.00
Smooth coated nails	1.90 to 2.00
Galvanized nails	3.90 to 4.00

To Retail Trade

	Base per Lb.
Bright wire	2.50c. to 2.40c.
Smooth annealed wire	2.40c. to 2.50c.
Smooth galvanized wire	2.90c. to 3.00c.

	Base per Keg
Standard wire nails	$2.60 to $2.50
Cement coated nails	2.00 to 2.10
Galvanized nails	4.00 to 4.10

	Base per Lb.
Polished staples	2.45c. to 2.55c.
Galvanized staples	2.70c. to 2.80c.
Barbed wire, galvanized	2.65c. to 2.75c.
Woven wire fence, per net ton	$65.00

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base. Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh	1.90c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.00c.
No. 10, blue annealed, del'd Phila.	2.19c.
No. 10, blue annealed, B'ham	2.05c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.05c.
No. 13, f.o.b. Chicago dist.	2.15c.
No. 13, del'd Philadelphia	2.34c.
No. 13, blue annealed, B'ham	2.20c.
Box Annealed, One Pass Cold Rolled	
No. 24, f.o.b. Pittsburgh	2.35c.
No. 24, f.o.b. Chicago dist. mill	2.45c.
No. 24, del'd Philadelphia	2.64c.
No. 24, f.o.b. Birmingham	2.50c.
Steel Exposed Sheets	
No. 24, f.o.b. P'gh	3.60c.
Galvanized	
No. 24, f.o.b. Pittsburgh	3.00c.
No. 24, f.o.b. Chicago dist. mill	3.00c.
No. 24, del'd Cleveland	3.08½c.
No. 24, del'd Philadelphia	3.24c.
No. 24, f.o.b. Birmingham	3.05c.
Enameling Ware Sheets	
No. 10 case	1.75c.
No. 12 case	1.90c.
Tin Mill Black Plate	
No. 28, f.o.b. Pittsburgh	2.55c. to 2.65c.
No. 28, f.o.b. Chicago dist. mill	2.65c. to 2.75c.
Automobile Body Sheets	
No. 20, f.o.b. Pittsburgh	3.20c.
Long Ternes	
No. 24, 8-lb. coating, f.o.b. mill	
Unassorted	2.25c.
Assorted	2.35c.
Electric Furnace Stock	
No. 24, f.o.b. Pittsburgh	3.70c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$5.00
Standard cokes, f.o.b. Gary	5.10

Terne Plate

(f.o.b. Bloomfield or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.20
15-lb. coating I.C.	12.90
20-lb. coating I.C.	14.00
25-lb. coating I.C.	$15.20
30-lb. coating I.C.	16.40
40-lb. coating I.C.	17.80

Alloy Steel Bars

(f.o.b. maker's mill)

S.A.E. Series Numbers	Alloy Quantity Bar Base, 2.65c. per Lb. Alloy Differential
2000 (1% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel-Chromium	0.55
3200 Nickel-Chromium	1.35
3300 Nickel-Chromium	3.80
3400 Nickel-Chromium	3.20
4100 Chromium-Molybdenum (0.15% to 0.25% Molybdenum)	0.50
4100 Chromium-Molybdenum (0.25% to 0.40% Molybdenum)	0.70
4600 Nickel-Molybdenum (0.20% to 0.30% Molybdenum, 1.25% to 1.75% Nickel)	1.05
5100 Chromium Steel (0.60% to 0.90% Chromium)	0.35
5100 Chromium Steel (0.80% to 1.10% Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 5c a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅜ in. and larger	$2.80
Spikes, ½ in. and larger	2.80
Spikes, boat and barge	$3.00
Tie plate, steel	1.95
Angle bars	2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	53 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
⅛	47	21½	⅛ and ¼	+11	+36
¼ to ⅜	53	27½	⅜	23	5
½	58	44½	½	28	11
⅝	62	50½	¾ and 1	34	15
1 to 3	63	52½	1¼ and 2	35	18

Lap Weld

2	53	45½	2	23	8
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong plain ends

⅛	40	26½	⅛ and ¼	+27	+18
¼ to ⅜	49	32½	⅜	13	5
½	55	44½	½	28	12
¾	60	49½	1 to 2	33	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 3½	34	20
4½ to 6	58	47½	4 to 6	33	19
7 to 8	54	43½	7 and 8	31	17
9 and 10	47	34½	9 to 12	24	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discount of 5 and 2½%.

Note: Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1¼ in.	1
2½ in. to 2¾ in.	46	1¾ in.	8
3 in.	50	2 in. to 2½ in.	13
3¼ in. to 3½ in.	54	2¾ in. to 2⅞ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	58	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel: Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron: Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	43	4½ 5 and 6 in.	46
2½ to 2¾ in.	46		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½ 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base, carloads	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Fabricated Structural Steel

More Than 152,000 Tons of New Projects Include 125,000 Tons for Pennsylvania Railroad

FABRICATED structural steel projects of the week reach 152,000 tons, comparing with 22,500 tons a week ago and 136,000 tons two weeks ago. A large part of this week's new tonnage is the Pennsylvania Railroad inquiry for about 125,000 tons of steel for electrification work between Washington and New York and new stations in Philadelphia and Newark. Other projects of the week were small except for a 1600-ton school in Chicago and an 1800-ton viaduct in Los Angeles.

In the first 12 issues of this year, THE IRON AGE has reported a total of 696,500 tons of new structural steel inquiries, while the total in the same number of issues last year was only 288,000 tons and in the same period of 1929, 464,300 tons.

Awards of the week are small, with only 16,000 tons reported, compared with 20,000 tons a week ago and 59,000 tons two weeks ago. Included are a power station at Safe Harbor, Pa., 2120 tons, and bridges for the Santa Fe Railroad, 3500 tons. Awards follow:

North Atlantic States

WARREN, N. H., 175 tons, State bridges, to Albany Bridge Co.

NEW YORK, 150 tons, dirigible dock for Goodyear Zeppelin Corpn. at Holmes Airport, Jackson Heights, to Austin Co.

NEW YORK, 1400 tons, warehouse on West Twenty-third Street for Spear & Co., to Levering & Garrigues.

FLEETWOOD, N. Y., 700 tons, apartment building, to unnamed bidder.

STATE OF NEW JERSEY, 1150 tons, highway bridges, 1000 tons to American Bridge Co., 150 tons to Belmont Iron Works.

SAFE HARBOR, Pa., 2120 tons, power house, to American Bridge Co.

The South

KINGSPORT, TENN., 135 tons, building for Tennessee Eastman Corpn., to Converse Bridge Co.

MEMPHIS, TENN., 360 tons, river towers for Memphis Power & Light Co., to Nashville Bridge Co.

Central States

CLEVELAND, 880 tons, West Third Street bridges for city, to Massillon Bridge & Structural Co.

FINDLAY, OHIO, 250 tons, bridge for Ohio State Highway Department, to McClintic-Marshall Corpn.

MARQUETTE, MICH., 2150 tons, ore dock for Duluth-South Shore & Atlantic Railroad, to McClintic-Marshall Corpn.

CHICAGO, 300 tons, interior work for Fine Arts Building, to McClintic-Marshall Corpn.

CEDAR RAPIDS, IOWA, 100 tons, water tower, to Chicago Bridge & Iron Co.

HUMBOLDT, IOWA, 265 tons, stand pipe, to Pittsburgh-Des Moines Steel Co.

SANTA FE RAILROAD, 3500 tons, 1931 bridge requirements, to American Bridge Co.

GRANITE FALLS, MINN., 275 tons, bridge, to Wausau Iron Works.

KAUKAUNA, WIS., 220 tons, bascule bridge, to American Bridge Co.

SUPERIOR, WIS., 350 tons, dock school, to Superior Shipbuilding Co.

Western States

LOS ANGELES, 150 tons, radio towers for Earle C. Anthony Co., to Pacific Iron & Steel Co.

LOS ANGELES, 2400 tons, bridge over Union Pacific tracks, to Pacific Iron & Steel Co.

Canada

GATINEAU POINT, QUE., 900 tons, bridge over Gatineau River for Provincial Government, to Dominion Bridge Co.

QUEBEC, 150 tons, addition to market building for City Council, to Eastern Canada Steel & Iron Works, Ltd.

RUSSELL, MAN., 150 tons, bridge for Provincial Government, to Dominion Bridge Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

NEW HAVEN, CONN., 1000 tons, Science Building for Yale University.

GREENWICH, CONN., 800 tons, six-story warehouse.

NEW YORK, 100 tons, building at 127 East Fifty-seventh Street. J. H. Taylor Construction Co., New York, builder.

NEW YORK, 350 tons, building at Ninety-sixth Street and Amsterdam Avenue for East River Savings Bank.

WINGDALE, N. Y., 1500 tons, Hudson Valley State hospital.

YONKERS, N. Y., 671 tons, Bronxville Lodge apartment buildings.

YONKERS, N. Y., 800 tons, high school.

WHITE PLAINS, N. Y., 350 tons, building for Battle Hill School; general contractor, D. M. W. Construction Co.

PINE STATION, LONG ISLAND, 1000 tons, addition to Pilgrim State Hospital.

HOBOKEN, N. J., 1000 tons, State hospital for the insane.

STATE OF NEW JERSEY, 1000 tons, highway bridges.

PHILADELPHIA, 500 tons, repairs to high-way bridges.

PENNSYLVANIA RAILROAD, 125,000 tons, including 12 bridges at Trenton and Newark, N. J., on Shellport branch and over Passaic and Hackensack Rivers, a signal station, 13,000 tons, express facilities, 3700 tons, and a plaza, 2500 tons, all at West Philadelphia; a passenger station and concourse at Newark, and 70,000 tons of steel for electrification work, which includes 37,000 tons of H-columns, 8000 tons of steel cross-bases, 6000 tons of cross arms and brackets and sag rods, 6000 tons of galvanized sub-station steel, 7000 tons of signal bridges, 3000 tons of sag braces, 2000 tons of box poles and 1000 tons of galvanized transmission towers.

PHILADELPHIA, 400 tons, repairs to Pier 11 for city; Kaufman Construction Co., Philadelphia, general contractor. Previously reported as awarded to Sheinmaker Bridge Co.

PHILADELPHIA, 5500 tons, section of Market Street subway from Thirtieth to Thirty-second Streets; Keystone State Construction Co., low bidder for general contract.

WASHINGTON, 1500 tons, two car floats for use at Cairo, Ill.; McClintic-Marshall Corpn., low bidder.

ROCHESTER, N. Y., 500 tons, Colgate University School.

BUFFALO, 1000 tons, New York State Training School for Boys.

ATTICA, N. Y., 900 tons, State Prison; bids rejected, to be readvertised.

The South

MEMPHIS, TENN., 2000 tons, two dredges for United States Engineer; bids April 15.

AUSTIN, TEX., 1110 tons, four river bridges for Texas State Highway Commission.

STATE OF LOUISIANA, 550 tons, bridge across Ouachita River.

Central States

WALBRIDGE, OHIO, 450 tons, bridge for Chesapeake & Ohio Railroad.

CLEVELAND, 750 tons, John Carroll University, previously reported as 200 tons.

GRANVILLE, OHIO, 175 tons, library for Denison University.

ROCK ISLAND RAILROAD, 360 tons, deck for Mississippi River bridge.

NEW TROY TOWNSHIP, ILL., 200 tons, highway bridges.

CHICAGO, 1000 tons, balconies and floors for Fine Arts Building.

SOUTH CHICAGO, 1200 tons, Bessemer steel plant for Wisconsin Steel Co.

CHICAGO, 1600 tons, Wells School; bids March 17.

CAIRO, ILL., 200 tons, armory.

WALSAU, WIS., 250 tons, State highway bridges; bids close March 25.

RACINE, WIS., 150 tons, State highway bridges; bids close March 23.

KANSAS CITY, MO., 350 tons, Jenkins music store.

ST. LOUIS, 400 tons, extension of erecting shop for Busch-Sulzer Brothers Diesel Engine Co.

Western States

STATE OF WYOMING, 100 tons, bridges.

OAKLAND, CAL., 210 tons, plates, 20-in. welded steel pipe, East Bay Municipal Utility District; Steel Tank & Pipe Co., low bidder.

LOS ANGELES, 1800 tons, viaduct.

SAN FRANCISCO, 320 tons, Pier 15; bids March 26.

SAN FRANCISCO, 300 tons, bridge over Islais Creek; bids April 29.

Canada

TORONTO, 3000 tons, market building for Merchandise Mart Syndicate, Imperial Bank Building.

PORT ELGIN, ONT., 150 tons, bridge; bid being received by A. A. McKinnon, township clerk.

Fabricated Steel Orders

WASHINGTON, March 17.—Bookings of 12,455 tons of fabricated structural steel in the week ended Feb. 21 was reported by 105 establishments to the Bureau of the Census. In the previous week orders reported by 111 establishments totaled 11,425 tons.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Available at 10c.—Tin Higher—Zinc Lower

NEW YORK, March 17.

Copper

The copper market presents a dual situation wherein custom smelters are willing to sell at 10c. a lb., delivered, while the primary producers are holding quite firmly at 10.25c. a lb. The 10.25c. quotation of the primary producers has been in effect since early last week and, in line with this lower domestic price, the export price of Copper Exporters, Inc., was reduced to 10.55c. a lb., delivered, European ports. Neither domestic nor foreign business has been active thus far in March, export orders not yet having reached 10,000 tons. Domestic users of copper are well covered for nearby requirements and some of them have coverage for several months; hence, they are showing very little interest in the market under the prevailing uncertain price situation. However, an inquiry has been issued by the Western Union Telegraph Co. for 1,500,000 lb., covering two months' requirements, and the settlement of this business may help to clarify the price situation. The primary producers are apparently content to let the custom smelters take such business as they can get at 10c. a lb. Primary producers are shipping a fair amount of copper on contracts and are themselves awaiting the development of conditions which may make for a better market. It is said that copper stocks are steadily being reduced and that within a reasonable time the situation may work itself out to a more stable basis. Lake copper also feels the effects of restricted current demand, and prices are lower than a week ago, now ranging from 10.25c. to 10.37½c., delivered.

Lead

Last week the American Smelting & Refining Co. reduced its contract price for lead from 4.60c. to 4.50c. a lb., New York. The corresponding price at St. Louis is 4.25c. Buying continues light. Sales for delivery in March are estimated at about 30,000 tons, which is close to present needs. Demand for April metal is not large, buyers in general contracting for only nearby needs. Statistics for February showed stocks of metal in the United States at over 122,000 tons, with the increase in output for that month about 9000 tons. Stocks are at the highest level in many years.

THE WEEK'S PRICES, CENTS PER POUND FOR EARLY DELIVERY

	Mar. 17	Mar. 16	Mar. 14	Mar. 13	Mar. 12	Mar. 11
Lake copper, New York	10.12½	10.12½	10.12½	10.12½	10.37½	10.12½
Electrolytic copper, N. Y.*	9.75	9.75	9.75	9.75	10.00	9.75
Straits tin, spot, N. Y.	27.50	27.12½		27.00	27.10	27.12½
Zinc, East St. Louis	4.00	4.00	4.00	4.00	4.00	4.05
Zinc, New York	4.25	4.25	4.25	4.25	4.25	4.30
Lead, St. Louis	4.25	4.25	4.25	4.25	4.25	4.25
Lead, New York	4.50	4.50	4.50	4.50	4.50	4.50

*Refinery quotations; price 1c. higher delivered in the Connecticut Valley

Tin

Although the market was quiet during most of the week, there was fair activity today at the New York Metal Exchange, and the price rose to 27.50c. Consumers do not appear, however, to be very much interested, as they are well covered for the near future and in many instances for some months ahead. Moreover, buyers apparently have little faith in the efforts to restrict production and are more impressed by the fact that stocks continue to be very large. Stocks at London today were 25,860 tons, a gain of 451 tons in the week. Shipments for the first half of March in the East were 2933 tons. London prices today were £123 for spot standard, £124 10s. for future standard, and £126 for spot Straits. The Singapore market was quoted at £125 12s. 6d.

Antimony

Due to the strength of silver in China, antimony is somewhat higher at 7.25c. a lb., New York, duty paid, for prompt, with futures at about the same figure.

Nickel

Wholesale lots of ingot nickel are still quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Zinc

A slight recession in quotations took place during the week. Prime Western is now available at 4c., East St. Louis, against 4.05c. a lb. a week ago. The New York quotation is 4.35c. a lb. Some inquiry has appeared for April metal and light sales have been made at 4.05c., East St.

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	17.25c.
*Copper, hot rolled, base sizes	19.87½c.
Seamless Tubes—	
Brass	20.12½c.
Copper	22.37½c.
Brass Rods	15.50c.
Brazed Brass Tubes	23.12½c.

*Extra for cold-rolled, 2c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.75c. to 10.25c.
Zinc sheets, open	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	29.50c. to 30.50c.
Tin, bar	31.50c. to 32.50c.
Copper, Lake	11.75c. to 12.25c.
Copper, electrolytic	11.50c. to 12.00c.
Copper, casting	11.25c. to 11.75c.
Zinc, slab	5.50c. to 6.50c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	7.50c. to 8.50c.
Antimony, Asiatic	10.00c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	24.00c. to 25.00c.
Alum. ingots, No. 12 alloy	22.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	19.75c. to 20.75c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	31.25c.
Tin, bar	33.25c.
Copper, Lake	11.63c.
Copper, electrolytic	11.63c.
Copper, casting	11.13c.
Zinc, slab	5.00c.
Lead, American pig	5.00c.
Lead, bar	6.00c.
Antimony, Asiatic	10.50c.
Babbitt metal, medium grade	15.75c.
Babbitt metal, high grade	23.50c.
Solder, ½ and ½	20.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.25c.	9.25c.
Copper, hvy. and wire	8.00c.	9.00c.
Copper, light and bottoms	6.75c.	7.75c.
Brass, heavy	4.75c.	5.75c.
Brass, light	3.75c.	4.00c.
Hvy. machine composition	7.00c.	7.75c.
No. 1 yel. brass turnings	7.00c.	7.50c.
No. 1 red brass or comp. turnings	6.50c.	7.50c.
Lead, heavy	3.25c.	3.75c.
Lead, tea	2.00c.	2.50c.
Zinc	2.00c.	2.50c.
Sheet aluminum	8.00c.	10.00c.
Cast aluminum	5.00c.	7.50c.

Louis. Sellers are not willing sellers ahead at present levels, and demand for prompt and March is not heavy. The tight position in the ore market is acting as a restraint on the smelters.

Non-ferrous Metals at Chicago

CHICAGO, March 17.—All prices, with the single exception of that for antimony, are easier in a market that is listless. Activity in the old metal market is at a low point.

Prices per lb. in carload lots: Lake copper, 10c.; tin, 27.85c.; lead, 4.35c.; zinc, 4.10c.; in less-than-carload lots, antimony, 8.50c. On old metals we quote copper wire, crucible shapes and copper clips, 7.50c.; copper bottoms, 6.50c. to 7c.; red brass, 6.50c. to 7c.; yellow brass, 4.50c. to 5c.; lead pipe, 3.50c. to 3.75c.; zinc, 1c. to 1.25c.; pewter, No. 1, 14.50c.; tinfoil, 15.50c.; block tin, 24.50c.; aluminum, 7c. to 8.50c., all being dealers' prices for less-than-carload lots.

Canada to Admit Free Sheets for Tinning

WASHINGTON, March 17.—Cold-rolled sheets to be coated with tin and hot-rolled sheets, hoop, band and strip steel to be coated with zinc will be admitted free of duty into Canada from all sources until Aug. 31, unless previously dealt with by Parliament, according to a report received from Commercial Attaché Lynn W. Meekins, Ottawa. The regulation granting free entry to these products was established by order-in-council dated March 11.

World Depression Subsiding, Says James A. Farrell

Signs are apparent of a steady, though gradual, improvement in world trade, declares James A. Farrell, chairman, National Foreign Trade Council, and president, United States Steel Corpn., in issuing the call for the eighteenth national foreign trade convention, to meet in New York on May 27, 28 and 29, next. World exports for 1930, as estimated by the council, amounted to about $27,000,000,000, almost $6,500,000,000 less than the export trade of 1929. In actual volume of export trade, however, figures now available show that, accounting for reduction in prices, the world in 1930 carried on 90 per cent of the export trade of 1929, and almost $1,000,000,000 more in exports than before the war.

In urging American foreign traders to consider very carefully the problems of the present year, Mr. Farrell says:

"There are indications that the world-wide depression in business, with which we have been dealing for several months, is subsiding and that the upturn is beginning.

"Our commerce confronts a situation which merits the consideration of all concerned in foreign trade. It is a time for thorough examination of economic conditions, and for practical demonstration of that spirit and habit of cooperation that so signally marks American foreign trade practice."

Plans are being made for the attendance of more than 3000 American foreign traders from 40 States, while foreign business men and delegates from American chambers of commerce abroad are expected from 20 foreign countries. Sessions will be held at the Hotel Commodore.

Sheet & Tube Expended $16,000,000 for Additions

In its pamphlet report for 1930, the Youngstown Sheet & Tube Co. states that plant additions, improvements and changes during last year involved an expenditure of approximately $16,000,000, compared with $22,900,000 for similar purposes in 1929. Such additions and improvements in both years were made without new financing. Dismantlements and abandonments during the year totaled about $3,700,000, making a gross property increase of $12,300,000.

The report states that the management is studying methods of producing sheets by the continuous mill process and expects soon to make a definite recommendation to the board of directors. The Youngstown Sheet & Tube Co. some time ago took out a license to use the continuous rolling process of the American Rolling Mill Co.

James A. Campbell, chairman of the board, said: "At this stage in one of the severest depressions ever experienced, both as to volume and price in its relation to present-day cost, there are indications that bottom has been reached and the outlook is encouraging for a gradual increase in volume throughout the year."

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Hawaiian Guitars to Have Alloy Steel Wire Strings

Now the Hawaiian guitar is going in for high-chromium alloy steels. An order has been placed in Cleveland by a Midwestern manufacturer of these instruments for a ton of Ascoloy 33, from which he is going to make rustless frets for his instruments. At the same time he ordered cold-rolled strip of the same alloy for making musical instrument picks.

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Sheet Steel Production Gained in February

Production of steel sheets by independent mills during February amounted to 192,218 tons, a gain of nearly 15 per cent over January, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers. Shipments gained during the month, but sales and unfilled tonnage declined. The February report and comparison in net tons follow:

	February	January	December
Sales	168,564	180,863	233,289
Production	192,218	167,865	145,125
Shipments	179,138	170,379	141,649
Unfilled orders	313,439	360,479	378,601
Unshipped orders	89,567	92,789	100,961
Unsold stocks	92,047	87,496	83,629
Capacity per month	496,850	551,200	539,800
Percentage reporting	67.6	67.6	67.6
Percentages, Based on Capacity			
Sales	50.2	48.6	63.9
Production	57.2	45.1	39.8
Shipments	53.3	45.7	39.5
Unfilled orders	102.3	96.8	103.8
Unshipped orders	26.7	24.9	27.7
Unsold stocks	27.4	23.5	22.9

To Scrap 10 Ships

WASHINGTON, March 17.—Bids will be received up to noon April 14 by the Shipping Board for 10 steel ships aggregating 62,695 deadweight tons, which will be scrapped or converted into barges.

Industrial Finances

National Steel Corpn. has declared a regular quarterly dividend of 50c. a share on the capital stock, payable March 10 to holders of record March 3.

Sharon Steel Hoop Co., Sharon, Pa., reports for 1930 a net loss of $752,803 after depreciation, interest and other charges. The company made a net profit of $2,248,029 in 1929. Severn P. Ker said in his report "While those best informed in the industry believe the year will show a marked improvement in volume compared with 1930, it is unlikely that full demand will be realized in the next few months." He added that some advances in market prices are necessary and will probably be realized as demand develops.

Westinghouse Electric & Mfg. Co., East Pittsburgh, earned net income available for dividends in 1930 of $11,881,705, equivalent to $4.45 a share of stock, and compared with $27,062,611 in 1929. Sales billed in 1930 amounted to $180,283,579, compared with $216,364,588 in the preceding year. Unfilled orders as of Dec. 31, 1930, amounted to $40,208,181, against $62,025,399 at the end of the preceding year.

Further Rise in Automobile Output Is Expected; Peak in May or June

DETROIT, March 16.

THE National Automobile Chamber of Commerce's estimate, although sometimes too high, places February output of motor vehicles in the United States and Canada at 230,364 units, or somewhat greater than the industry had anticipated. This is 29 per cent better than in January and represents the largest production in six months. It is accounted for principally by the increased assemblies of the Ford Motor Co., which totaled 85,109 cars last month, compared with only 55,182 cars during the previous month.

It is this rapid acceleration of Ford's activities which is chiefly relied upon to put March across the 300,000 mark. The minimum expected from Ford this month is 100,000 cars, and it is said that there is a strong possibility that output may reach 125,000. It is interesting that Ford and Chevrolet, which jockeyed with each other for the lead for several months, are almost back to their former positions. In 1930 Ford turned out some 42 per cent of all cars produced, Chevrolet 23 per cent. However, in January of this year Ford dropped to 30 per cent, while Chevrolet rose to 39 per cent. February brought a "back to normaley" performance, with Ford rebounding from its low point of 30 per cent up to slightly less than 37 per cent; meanwhile, Chevrolet lost a full 10 points, falling from 39 per cent to 29 per cent. It now looks as though the movement back to last year's relative standing for the two leaders would not be halted, as Ford is likely to pass the 40 per cent mark again this month and Chevrolet probably will lose 2 or 3 points.

First Quarter Output Will Be About 700,000 Cars

ON the assumption that March production will be close to 300,000 cars, it is evident that the first quarter's output will be about 700,000 cars, contrasted with 1,069,000 cars in the corresponding period last year. This means that if the 1930 record of 3,500,000 cars is to be attained, the industry must manufacture in the last nine months of the year an average of 310,000 cars a month. If the 4,000,000 goal is reached, the average must be raised to 365,000 a month. Some enthusiasts are still predicting 4,500,000 cars this year, but this would necessitate further boosting the monthly average to 422,000 cars. Only once in the history of the industry—in 1929—did the monthly average get as high as 400,000. With the exception of 1927 and 1930, however, it has been better than 300,000 in every year since 1922. In those two years it fell just short of that mark. Therefore, study of what the industry has done in recent years reveals that production in 1931 is fairly sure to measure up to 1930, may go as high as 4,000,000, but is not likely to rise much above that figure.

OBSERVERS are agreed that the peak month this year will be later than usual. Some think that it will be May, others June. It is not too much to expect it to be rather late in the year, as in 1928 August was the best month. With this precedent, a few executives are of the opinion that July or August will be the highest point. In any event, the industry is confident that the next four or five months will be relatively good, that the next 30 to 60 days will see substantial expansion of manufacturing programs, and that the summer months will not bring a noticeable diminution in factory schedules. All of this should be good news to steel makers, who are looking to the automobile industry for a good share of their business.

There has been a considerable pick-up in retail automobile sales, although those parts of the country which felt the effects of the recent blizzard suffered a temporary setback. The volume of business, however, has not been nearly large enough to absorb current production, but stocking of dealers is going ahead on a conservative basis. In numerous cases dealers have had abnormally low inventories, which must be liberally supplemented to meet the anticipated spring demand. This condition of factory programs, although somewhat out of line with retail orders, probably will continue through March and possibly April. Nevertheless, the industry is in a splendid position to maintain stocks at reasonable levels and has no intention of allowing them to became unwieldy.

Automobile production in February, at 230,364 cars (estimate of National Automobile Chamber of Commerce), was largest in six months. Ford's output was 85,109 units, an increase of 29,927 units over January and 40,077 units over December.

* * *

First quarter's total probably will be 700,000 cars, a monthly average of 233,000. If the year's production is to reach the 1930 figure, the monthly average in the last three quarters must be 310,000; if it is to attain the four million mark, it must be 365,000.

* * *

Peak month in automobile industry expected to be May or June. Next 30 to 60 days should see substantial expansion of manufacturing programs.

* * *

Canada's higher import duties on foreign cars have already resulted in enlargement of production by American makers in the Dominion.

Steel Orders Reflect Growing Production Schedules

STEEL specifications from the Detroit district continue to reflect the growing activity in the automotive industry. Several large makers have placed good-sized orders in the past week. Almost without exception this material is for 7 to 10 days' delivery. It is true that as production expands, automobile makers must maintain somewhat larger inventories as a precautionary measure, but at best these are meager. The result is that mills catering to the automobile trade have virtually no backlogs, nevertheless their shipments from week to week are steadily increasing. The Newton Steel Co. began operating its Monroe, Mich., sheet mills on Feb. 26.

THE Ford Motor Co. has added a second body model with sloping windshield, patterned after its Victoria coupe introduced last fall. It is a town sedan selling at $625, f.o.b. Detroit. The front end is finished similar to the Victoria, with composite radiator shell partly lacquered and no sun visor. The body is 2 in. longer

than the former model and appears slightly wider. All window glass is curved at the top. The cross seat is of the sliding type with the seat mounted on ways. The adjustment incorporates a return spring to make forward movement of the seat easier. Additional leg room for the rear compartment is obtained by sinking the floor pan between the sills.

Despite the slowing up of industry in 1930, by-products derived from manufacturing in the Ford plants again reached new high figures in several lines. From the coking process alone was produced over 15,000,000 gal. of coal tar, 17,876 tons of ammonium sulphate, 14,000,000 gal. of motor benzol, more than 19,900,000 cu. ft. of gas and 1,225,183 tons of coke. The coal tar was burned as fuel, the ammonium sulphate sold for fertilizer, thousands of motorists bought Ford benzol in Detroit, and the Ford company consumed part of the gas, selling the remainder to the Detroit City Gas Co. Ford mines last year turned out 2,434,052 tons of coal.

Canadian Automobile Output May Undergo Expansion

THAT the recent increase in the Canadian import duties on automobiles will result in a considerable expansion of production in the Dominion by American manufacturers is becoming evident. Nash has entered into an agreement with Roy Kerby, president of Durant Motors of Canada, whereby a new company to be called Dominion Motors, Ltd., will be organized to acquire the assets of Durant Motors. Mr. Kerby will be president and Mr. Nash chairman of the board of the company, which will make the Nash and also a new automobile to be sold by Durant Motors' present dealers. Hudson is now investigating Canadian possibilities, but higher production costs there may deter action. General Motors of Canada will renew operations at its plant at Regina, Saskatchewan, and Ford Motor Co. of Canada has announced that it will build a new assembly plant near Vancouver, B. C. Dodge Brothers trucks and the Chrysler Imperial, heretofore imported from Detroit, will be made by Chrysler Corpn. of Canada.

Reo has increased the price of its Royale line, effective April 1, from $2,485 to $2,745, f.o.b. Lansing. It likewise has contracted with Continental Motors Corpn. to supply eight-cylinder motors, which will be built at the latter's Detroit plant. It is said that this contract may call for 10,000 units before the end of the year. Continental also is furnishing motors for the new DeVaux-Hall Motors Corpn. at Grand Rapids. DeVaux-Hall has just acquired two additional pieces of property, one of which will house its testing, shipping, loading and export boxing operations and the other the engineering department, parts stock room and a division of the engineering department. Hayes Body Corpn., which is making the DeVaux bodies, is enjoying increased orders from Marmon and Peerless. Marmon has organized a subsidiary, the Marmon Herrington Co., to manufacture multiple-drive commercial cars of a highly specialized nature. G. M. Williams, Marmon's president, will head the new company, with F. E. Moskovics as chairman of the board. Mr. Moskovics formerly was president of Stutz and for many years has been identified with the automobile industry. The trucks will be made in the present Marmon plant at Indianapolis, although the passenger car and truck divisions will be separate. The Marmon 16 is expected to get into production this month.

Reinforcing Steel

Week Has Been Light—Awards 4200 Tons

LETTINGS of reinforcing steel the past week were in lighter volume, totaling 4200 tons, compared with 5600 tons in the previous week. The largest award was 1000 tons for a filtration plant at Fort Wayne, Ind. Pending projects were also smaller at 4900 tons, 2000 tons of which is for a freight terminal and warehouse in New York for the New York Central Railroad. Awards follow:

CHICOPEE, MASS., 275 tons, water purification plant, to Joseph T. Ryerson & Son, Inc.

CAMBRIDGE, MASS., 145 tons, Massachusetts Institute of Technology unit foundation, to Kalman Steel Co.

NEW YORK, 500 tons, deck of Hudson River bridge, to McClintic-Marshall Corpn.

NEW YORK, 225 tons, Walker-Lispenard telephone exchange building, to unnamed bidder.

BROOKLYN, 150 tons, private memorial in Cypress Hills Cemetery, to Joseph T. Ryerson & Son, Inc.

YONKERS, N. Y., 500 tons, sewer construction for Westchester County Sewer Commission, to Ross Brothers.

BALTIMORE, 250 tons, highway bridge for city, to Joseph T. Ryerson & Son, Inc.

WASHINGTON, 375 tons, Palais Royal warehouse, to Concrete Steel Co.

WASHINGTON, 150 tons, Hugh M. Brown Junior High School, to Concrete Steel Co.

CLEVELAND, 150 tons, West Third Street bridge, to Concrete Steel Co.

FORT WAYNE, IND., 1000 tons, filtration plant, to an unnamed bidder.

INDIANAPOLIS, 275 tons, Veterans' Hospital, to Holliday & Co.

SEATTLE, 400 tons, bridge on Bell Street, to an unnamed bidder.

SAWTELLE, CAL., 300 tons, school auditorium, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BOSTON, 700 tons, Kenmore Station extension.

NEW YORK, 200 tons, foundations for paved post building on West Thirty-third Street; J. R. Miller, general contractor.

NEW YORK CENTRAL RAILROAD, 2000 tons, freight terminal and warehouses on Washington Street.

READING, PA., 550 tons, bridge on Buttonhole Street.

PHILADELPHIA, 325 tons, subway section on Market Street. Keystone State Construction Co., low bidder for general contract.

CLEVELAND, 400 tons, Huron Road hospital.

HAMMOND, IND., 150 tons, City Hall.

CHICAGO, 400 tons, Katzinger warehouse.

SACRAMENTO, 200 tons, paving in Imperial County; bids opened.

Railroad Equipment

Northern Pacific has ordered 500 underframes and a like number of superstructure sets from Siems-Stembel Co.

Uruguayan State Railways have ordered five combination passenger and baggage gasoline rail motor cars from J. G. Brill Co.

Detroit Scrap Easier, But Prices Are Unchanged

DETROIT, March 17.—The scrap market was slightly easier the past week, although there has been no change in prices. The local steel plant has fairly good stocks on hand, and consequently is not interested in buying further tonnage. With prices at Buffalo and Cleveland relatively low, steel mills at those points are not expected to take much scrap from Detroit during the spring months.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$9.00 to	$9.50
Borings and short turnings	4.75 to	5.25
Long turnings	4.25 to	4.75
No. 1 machinery cast	9.50 to	10.00
Automotive cast	11.25 to	11.75
Hydraul. comp. sheets	8.75 to	9.25
Stove plate	6.50 to	6.75
New No. 1 busheling	7.75 to	8.25
Old No. 2 busheling	3.25 to	3.75
Sheet clippings	6.25 to	6.50
Flashings	7.75 to	8.25

Announces Two-Spindle Automatic Chucking Machine

(*Concluded from page* 948)

admits and exhausts air at the large end to produce the reciprocating motion. The valve handle is tripped automatically to open the chuck as it approaches the loading position. With air at 60 lb., chucking pressure of 2100 lb. is obtained at the jaws. Power for the indexing is furnished by the special double air cylinder on top of the turret.

The combination chip pan and coolant reservoir is cast integral with the bed. Chips are removed through the hole in the bed at the turret end. Finished pieces can also be guided out through this hole on a wire chute. The lubricant pump is mounted on the boss shown on the rear of the machine. Practically all of the bronze bearings are oiled by means of the mechanical lubricator shown under the headstock.

PERSONALS

R. A. SOLBORG has been elected vice-president of the Armco International Corpn., export subsidiary of the American Rolling Mill Co., Middletown, Ohio. He became identified with the company in 1916 as assistant export manager and three years later was transferred to the New York office in the same capacity. In 1926 he became district manager, with headquarters in Paris, France, shortly afterward having been placed in executive charge of sales in Continental Europe.

R. A. Solborg

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BRADLEY STOUGHTON, since 1923 professor of metallurgy at Lehigh University, has become consulting metallurgist for the Standard Steel Works Co., Burnham, Pa.

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OTTO P. GEIER, of the Cincinnati Milling Machine Co., Cincinnati, will discuss "Employers' Responsibility to Modern Management Problems" at the twenty-fifth annual meeting of the Indianapolis branch of the National Metal Trades Association, to be held at the Columbia Club, Indianapolis, March 26. J. E. NYHAN, executive secretary of the national association, is to speak on "Industrial Stabilization in the Metal Trades."

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LESTER LANNING, metallurgist, New Departure Mfg. Co., Bristol, Conn., is scheduled as a speaker at the meeting of the New Haven chapter of the American Society for Steel Treating, March 19, in the Chase Auditorium, Waterbury, Conn. He will take as his subject "Heat Treatment of Steel, Header Dies, Alloy Tools and Bearing Steel."

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THOMAS J. KILEY, metallurgist, Brown & Sharpe Mfg. Co., Providence, R. I., discussed high-test cast iron at the meeting of the New England Foundrymen's Association at the Engineers' Club, Boston, on March 11.

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A. F. STEEN, for over eight years furnace engineer in charge of heat treating equipment at the tractor works of the International Harvester Co., has been placed in charge of the service department of furnace engineering of the Chicago Steel Foundry Co., Chicago. WALTER J. HANSEN, formerly with Electroalloys Co., Elyria, Ohio, has become identified with the Syracuse, N. Y., office.

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DR. HARVEY N. DAVIS, president of Stevens Institute of Technology, is to address the Providence, R. I., section of the American Society of Mechanical Engineers, March 19, on "The Engineer in Industry."

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S. R. OLSON, director, International Construction Co., Ltd., London, England, European representative of Morgan Construction Co. and other American companies, is a visitor in this country.

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CARL A. JOHNSON, president of the National Machine Tool Builders' Association, will speak as a part of the program of a salute to machinery builders to be broadcast by the Westinghouse Electric & Mfg. Co., on April 26, at 9:45 p.m.

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LOUIS A. WAY has been appointed manager of production and sales in the roll department at the Ellwood plant of the Aetna-Standard Engineering Co., Youngstown, Ohio. Mr. Way was for a time vice-president in charge of sales for the Pittsburgh Steel Foundry Co., Glassport, Pa., and prior to that served as president of the Sharon Foundry Co., Sharon, Pa.

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C. E. MEISSNER, formerly sales manager for the Chrome Steel Corpn., Chrome, N. J., has become associated with the Marine Steel Corpn., Chrysler Building, New York, as production manager.

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JOSEPH H. BARBER, assistant to the president of the Walworth Co. and a vice-president of the Institute of Management, last week spoke on what price changes mean in executive control, before the New England Purchasing Agents' Association.

E. M. VEHMEYER, who has been associated for more than 22 years with Joseph T. Ryerson & Son, Inc., Chicago, has been appointed manager of the Detroit plant. The major portion of his service with Ryerson has been spent in the sales and service departments. For the past two years he has been sales manager in the Detroit plant. W. H. BASSE, formerly Detroit plant manager, has been transferred to Chicago to engage in special sales work.

E. M. Vehmeyer

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WILLIAM BREWSTER, arc welding specialist of the General Electric Co., New Haven, Conn., last week gave a demonstration of welding to the Hartford, Conn., chapter of the American Society for Steel Treating.

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H. E. BROMER, metallurgist, Standard Foundry Co., Racine, Wis., addressed the March dinner meeting of the Milwaukee section, Society of Automotive Engineers, on the subject, "Electric Furnace Iron and What It Means to the Automotive Engineer."

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V. W. COLLINS, comptroller, Rome Wire Co., Rome, N. Y., and president, National Association of Cost Accountants, was guest of honor at the March dinner meeting of the Milwaukee chapter of the association.

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H. H. MAGDSICK, executive engineer, Nela Park engineering department, General Electric Co., presented an illustrated address, "Building Prosperity Avenue," before the

monthly meeting of the Engineers Society of Milwaukee on March 18. The meeting was sponsored by the Milwaukee section, American Institute of Electrical Engineers.

H. R. WALTERS, formerly manager of the fabrication and erection department of the Bethlehem Steel Corpn., has been appointed assistant to GEORGE H. BLAKELEY, president of the McClintic-Marshall Corpn. JOHN N. MARSHALL has been made assistant to the vice-president in charge of operations, and JONATHAN JONES, chief engineer. Mr. Marshall and Mr. Jones continue in the capacities which they held with McClintic-Marshall before it was taken over by Bethlehem. C. H. MERCER, who was chief engineer of the fabrication and erection department of the Bethlehem company, has become consulting engineer of the McClintic company and C. A. JOHNSON, manager of sales. Mr. Johnson was manager of sales of fabricated material made by Bethlehem.

FRANK L. ESTEP, vice-president and chief engineer of the Perin Engineering Co., 11 West Forty-second Street, New York, formerly Perin & Marshall, Inc., has returned to this country from a sojourn of several months in England.

B. J. LARKIN, who was recently connected with the J. I. Case Co., has assumed the management of the Algoma Foundry & Machine Co., Algoma, Wis.

N. R. PATTERSON, Patterson Steel Co., Tulsa, Okla., has been elected president of the Midwest Structural Steel Salesmen's Association. F. N. LEWIS, Joplin, Mo., was elected vice-president and W. D. TRUMAN, Kansas City, was reelected secretary.

EUGENE J. MADDEN, distribution manager, Air Reduction Sales Co., Milwaukee district, has been promoted to a similar position in the New York metropolitan district. He is succeeded by H. B. WELCH, JR. SAMUEL H. SMITH is district manager at Milwaukee.

F. E. RENNEBAUM has been elected president of the Gross Lead Burning & Coating Corpn., Cleveland, succeeding LOUIS GROSS, who has severed his connection with the company. CHARLES NEAR has succeeded Mr. Rennebaum as vice-president. L. R. SCHLUNDT has been given the title of general manager in addition to being reelected secretary.

THOMAS HOLLOWAY, formerly identified with the Farrell Foundry & Machine Co. at Buffalo, has been appointed gear consultant for the United Engineering & Foundry Co., Pittsburgh.

OBITUARY

CHARLES SANFORD KNIGHT, JR., sales manager of electrical wire and wire rope for the American Steel & Wire Co., Chicago, died on March 11 while on a trip in the Southwest. He was born at Worcester, Mass., June 15, 1864. At the age of 14 he was employed by the Washburn-Moen Mfg. Co., Worcester, as a weigher and timekeeper. A few years later he was made a foreman and, after serving in this capacity for a few years, he entered the sales department. In 1893, Mr. Knight was made manager of the sales office at Pittsburgh and six years later was transferred to Chicago to become sales manager of electrical wire and wire rope, which was the position he held at the time of his death. His service with the American Steel & Wire Co., which is the successor of the Washburn-Moen Mfg. Co., extended over a period of 53 years.

Charles S. Knight, Jr.

JOHN A. CONDO, who had been identified for 34 years with the Mutual Wheel Co., Moline, Ill., died at his home at Rock Island, Ill., March 13, aged 52 years.

GEORGE L. PETTIBONE, of the Rock Island Plow Co., Rock Island, Ill., died of heart disease on March 13, aged 55 years. He had been associated with the Emerson-Brantingham Mfg. Co. for 22 years, as branch manager at Harrisburg, Pa., and Dallas, Tex.

ROBERT WOODWARD, formerly chairman of the board of directors of Edgar Allen & Co., Ltd., Sheffield, England, died on March 9, aged 88 years.

OLAF LANGELEY, chief engineer of the United States Lead Refining Co., East Chicago, Ind., died on March 14. He was president of the Highland Chamber of Commerce and vice-president of the Calumet Seaways Association.

CHARLES W. DARROW, for 20 years president of the Darrow Sheet Metal Works, Benton Harbor, Mich., died March 3 after a long illness.

ALFRED BISHTON BOTFIELD, an originator of high-temperature cement and organizer of the Botfield Furnace Specialties Co., Philadelphia, now Botfield Refractories Co., died in Miami, aged 83 years. He retired from active business in 1915.

FRANCIS G. HITCHINS, for 39 years vice-president of Headford Brothers & Hitchins Foundry Co., Waterloo, Iowa, died at his home there on March 7, aged 65 years.

HENRY MCDERMOTT, iron mining expert and engineer, died at his home in Milwaukee on March 8, aged 86 years. He was a native of Scotland and came to America at 21, engaging in logging and lumbering in Canada. When the Lumbermen's Mining Co. was organized at Menominee, Mich., Mr. McDermott was engaged to prospect the northern Michigan area from Norway to Iron Mountain, and discovered among others the famous Ludington mine at Iron Mountain. Afterward he discovered and developed the Helen open pit mine at Michipicotton, Ont. Meanwhile Mr. McDermott perfected numerous safety devices for mines and an underground loading device now in general use. He also was the designer of the steam set for setting and sawing logs by mechanical means.

The American Society for Testing Materials has issued a booklet which gives, in the shape of folders, the tables of chemical compositions, physical and mechanical properties and corrosion-resistant properties of corrosion-resistant and heat-resistant alloys. These tables are reprinted from the proceedings of the Society for 1930 and are a valuable publication.

"Abstracts of Articles on Fatigue of Metals Under Repeated Stress Appearing in the Technical Press from July 1, 1929, to June 30, 1930," is offered in the shape of a small booklet by the American Society for Testing Materials research committee on fatigue of metals and presents an up-to-date set of abstracts of articles on this subject.

Stresses Need for Stability

President of Concrete Bar Institute Pleads for Enlightened Competition

THE need for a more stable market for reinforcing bars was emphasized by C. Louis Meyer, president, Concrete Reinforcing Steel Institute, at the seventh annual meeting of that organization, held at Biloxi, Miss., March 16 to 18. He deplored the persistence of illogical and unreasonable competitive practices and urged a more general application of trade practice conference rules as a "way out." He reported further progress in standardization, the completion of a code of standard practice and the prospective adoption of a quality mark for reinforcing steel. Total reinforcing steel business in 1930, he stated, showed a decline of only 5 per cent from 1929. His remarks, in part, follow:

"We need a stable and more profitable market in reinforcing bars. We must have an adequate profit if we are to remain in business. Adequate profit margins are the most important subject for this industry to think about at the present time. This is not a new problem. It is our problem in time of prosperity as well as adversity.

"We must get to the bottom of this perplexing problem. It is true that the problem is somewhat different in every locality; that is, the competitive elements, being somewhat different, make the solution different in each case. There is one underlying principle, however, which is applicable to every market. We have all learned from our own experience that we have very definite costs accruing from the warehousing and fabricating of bars. These costs will probably average between $6 and $8 a ton. It is therefore preposterous to sell bars with a gross margin of only $2 or $3 a ton. To continue to do so means a continuance of the red ink battle in your accounting department. Some may offset our indulgence in the reinforcing bar market by applying profits made from the sale of other commodities against the losses resulting from sales of reinforcing bars. This indulgence cannot be carried on indefinitely, for sooner or later we must all realize that each commodity must stand on its own bottom, that each commodity must earn its own profit.

Market for Concrete Bars Diversified

"I believe the way out of this price cutting problem is through the application of the rules of our Federal trade practice conference. A published price and a one-bid policy are fair, sound, logical, and reasonable policies from which we may all benefit and profit.

"During 1928 and 1929 we enjoyed the greatest construction volume ever known, and during 1930 we have witnessed the most serious business depression in the history of this industry. It is interesting to observe that from one extreme to the other the decline in reinforcing steel tonnage, as reported by the Concrete Reinforcing Steel Institute, was only 5 per cent. This is undoubtedly due to the fact that reinforcing steel is used in so many diversified fields. It is used in buildings of every description and type: in roads, pavements and bridges; in engineering work of all kinds, including dams, sea walls, sewers, reservoirs, etc.

"One of the outstanding economies to the industry accomplished by this institute has been developed through its program of standardization. During this year the standard 11 sizes of bars will practically be in universal use throughout the entire United States. The adoption of intermediate grade as a single standard grade for reinforcing bars has resulted in shipments of about 87 per cent of the billet steel tonnage as reported by the members to the institute during the past two years. This percentage will be substantially increased during the present year, for the Pacific Coast is now in a state of transformation from structural grade to intermediate grade. This change will undoubtedly be accomplished before the end of the present year.

"Assuming that we may have the support of the steel mills in the promotion of a quality mark (for reinforcing bars), I feel that we are now ready to make some real and definite progress. A quality mark applied to reinforcing bars of new billet grade with the support of the steel mills, and with an ample promotional and advertising campaign carried on by this institute, will accomplish much in the elimination of inferior grades of reinforcing bars.

Mill Competition Deplored

"It is entirely proper that every mill rolling reinforcing bars should give its financial and moral support to the institute, for all of the major activities of this organization are of such a character that the mills benefit from them in the same degree as the fabricators or distributers. Fortunately, a large number of the mills are continuing their constructive policy of selling their product only through jobbers and fabricators. Some mills are still pursuing the illogical policy of selling direct to the trade, and attempting also to sell to the distributer. The future permanance and success of this industry can only be maintained by retaining the sale and distribution of reinforcing bars through normal and logical and economic channels, namely, through the distributers and fabricators.

"The Forms Department Committee has recently completed its Code of Standard Practice, and as a part of an advertising campaign is now distributing this code in the form of a printed circular to the architects and engineers of the country. It is believed that this code will accomplish much in the way of standardizing sizes of concrete joist construction, field erection practices, etc., all of which should prove a definite economy to those factors interested in selling and erecting forms. The advertising campaign of the forms department which will proceed during the current year includes circulars showing the adaptability of concrete joist construction to many types and classes of buildings, as well as its economy, stability and speed of construction.

"This institute may well claim credit for the Federal trade practice activities of the industry, for it was through the physical and the financial support of the institute that it was possible to hold our Federal trade practice conference in Asheville two years ago. The application of the rules of this conference to our industry, through the activities of the Trade Practice Executive Committee, and the setting up of local machinery to administer these rules in several localities is of even more importance."

Eastern Steel Co. to Be Sold in April

Public sale of all assets of the Eastern Steel Co., Pottsville, Pa., will be held by permission of the court on April 20, at the plant. The sale is in charge of Samuel T. Freeman & Co., auctioneers, Philadelphia, who will accept bids for the plant, either as a going company, or for its value as scrap. Meanwhile, identity of the recent purchaser of the company's $1,800,000 worth of bonds has not been disclosed by Samuel K. Phillips & Co., Philadelphia, who acted as agents in the transaction.

Colorado Fuel & Iron Co. reports for the year ended Dec. 31, 1930, net profits of $298,649 after all charges including taxes, equal after preferred dividends to 40c. a share on the common stock, compared with $6.42 a share in the preceding year. A special meeting of stockholders will be called soon to vote on a plan approved by the directors to reduce the value of the stated common stock outstanding from $34,050,500 to $8,512,625 and to create a surplus of $8,619,256, leaving the earned surplus at the close of the year at $5,491,186.

The thirteenth Exposition of Chemical Industries will be held at the Grand Central Palace, New York, from May 4 to 9.

Benjamin Schwartz

Scrap Dealers Adopt Aggressive Program to Protect Their Interests

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THE Institute of Scrap Iron and Steel, which in the three years since it was organized has attracted a membership of about 400 dealers and brokers in old material in all of the principal districts of the United States, adopted a militant program at its annual convention last week in Cleveland to prevent the disruption of the scrap iron industry through "direct dealing" and other practices which tend toward the elimination of the dealer or broker in the handling of the country's old iron and steel.

One of the resolutions adopted by the convention recommended that negotiations with the American Iron and Steel Institute with reference to "direct dealing" be continued, with the "ultimate aim of bringing the leaders of the steel industry to a realization that the elimination of the scrap dealer is against the interests of the steel industry and against the national welfare."

Another resolution served notice on the railroads of the country that the scrap industry will closely scrutinize what are alleged to be unfair practices in the disposition of the large tonnages of scrap which the carriers offer for sale. This resolution was phrased as follows:

"That the national office be requested to compile and maintain a list of the railroads classified as to their scrap policies; that the members be requested to inform the national office of any departures from fair and competitive bidding and awards in the marketing of railroad scrap; that the institute render a copy of a classified list to all members and keep members posted periodically as to revisions."

Railroads Charged with Discrimination on Scrap

It was charged that some railroads are favoring the ultimate consumer in the disposal of their scrap, a practice which the scrap trade is said to regard as discriminatory and unfair in view of the fact that the dealers themselves are large shippers over the country's railroads.

The negotiations with the American Iron and Steel Institute are expected to converge on the recently adopted policy of a large steel company in establishing its own scrap yard and in buying unprepared scrap, thereby rendering more or less useless the large investment in machinery in dealers' scrap yards for scrap preparation. The steel institute some time ago appointed a committee consisting of James A. Farrell, president, United States Steel Corpn.; Eugene G. Grace, president, Bethlehem Steel Corpn., and L. E. Block, chairman, Inland Steel Co., to meet with the scrap institute on matters of joint interest, and one or two conferences were held last year.

Asks Department of Commerce to Make Scrap Survey

The Institute of Scrap Iron and Steel also decided to ask the Department of Commerce to undertake a survey of the marketing and distribution machinery of the scrap industry to determine the sources of scrap, its normal outlets and the channels of distribution. It set in motion a plan to organize a trade promotion bureau, which shall handle research problems and seek wider markets for scrap. This bureau was authorized to undertake a program of improving public relations through advertising and publicity.

Recognizing that the scrap industry may not longer be able to subsist on the speculative profits of past years, the institute also decided at its convention to appoint a national cost committee to conduct a cost survey of the industry and engage, if necessary, the services of a firm of cost accountants to create a cost manual to guide the industry as to uniform methods of cost accounting in the handling of scrap.

Scrap Men Urged to Fight to Save Their Business

Benjamin Schwartz, director general of the scrap institute, whose organizing ability has brought together a strong association within three years after other efforts along such lines had resulted in failure or indifferent success, delivered an emphatic message to the convention, in which he spared neither the faults of the scrap dealers themselves nor the outside influences which threaten the profitable existence of the industry.

In an appeal to the scrap men to fight to "save the foundations of the business," he brought nearly 200 to their feet to cheer him and aroused an apparently strong determination on the part of the institute members to carry on the work that has been started in the past few years to put the scrap business on a new basis.

"We have it in our power to make a real place for our industry," said Mr. Schwartz, "or we have it in our power to wipe ourselves out of the economic scheme of things and invite others to do our work. I believe in this industry and its future. I believe it has a definite place in our economic structure and I am willing to fight for it. It is our job to get together and cooperate without delay to save the foundations of our business. If we don't, then we may as well prepare ourselves to get back to our horses and wagons."

Mr. Schwartz presented what he called a five-year stabilization program, which involves a widespread reorganization of the scrap business, the merging of many competing units, the development of new markets, the organization of an export company under the Webb-Pomerene law, an advertising program and the elimina-

tion of unwholesome or uneconomic practices in scrap trading methods.

Urges Carrying on of Work to Build Sound Future for Trade

Asserting that much has already been accomplished both for the benefit of scrap purchasers and the members of the scrap institute themselves during the past three years, Mr. Schwartz argued for a carrying on of such work in the building up of a sound future for the business.

"It is too much to expect," he said, "that a whole generation of cut-throat competition and confiscation should change overnight, or even in three years, to a golden era of cooperation, but I have been witness to the fact that the benefits of cooperation have already been felt in the industry. When competitors who never knew each other or dealt with each other at arm's length are brought together as frequently as they are in the institute meetings, when they discuss at these meetings their industrial problems and their relationship to the national welfare, when they partake of some of the social benefits which good fellowship in an organization gives them, no one can deny that the rough edges of competition are gradually smoothed out, that hate, misunderstanding and suspicion disappear, that they see themselves in the light of human beings, who are, after all, interested in the same objective—the making of a profit on their investment and an honest return for their labors.

"Will the scrap iron dealers destroy these values? They can easily do so by withdrawing their support and weakening the effectiveness and prestige of the institute. When they do destroy it, let them be prepared to admit to the world that they are not entitled to be recognized as an industry, that they are merely scavengers on the fringe of our economic life. When they do destroy it, let them be prepared to face the laughter of the steel industry and the public, which have been taught to look with respect at this stage of the institute and upon the scrap iron dealer and the business which we wish to call a basic industry of this country."

New Program Involves Mergers of Many Scrap Yards

After making this plea for a strengthening of the scrap institute itself, Mr. Schwartz laid out a program for the scrap industry.

"So long as steel is basic to our civilization, so long as there is need to preserve the iron ore reserves of the country, the future of the scrap iron dealer is assured," he said, "but this is subject to one qualification. If we are determined to continue operating our business as in the past, if we continue the disastrous cut-throat competition for the same tonnage of scrap, if we do not adjust ourselves to new economic conditions as an industry, we will eliminate ourselves from consideration as the agencies to render this service.

"There is accumulating evidence that many consumers are not satisfied with the service which we have rendered. We are responsible for our own difficulties; we need not look elsewhere. It is within our power to give the consumers a proper economic answer."

Mr. Schwartz's first recommendation was that the scrap dealers in various localities immediately consider the matter of merging various yards. He commented on the fact that in many cities five or six yards are now competing for the business that one or two properly equipped yards could handle more economically and with better service to the scrap consumer.

"This excessive competition," he said, "has brought about a craze for volume without regard to the rights of competitors or without regard for profits, and has resulted in the illogical dumping of scrap in other markets. The ultimate cost of this overproduction and waste, which serves neither the industry, the consumers nor the public interest, must inevitably be borne by the steel industry in the cost of its raw materials." He added that the time has come for the scrap dealers to study their marketing machinery with the aim of consolidating their interests wherever conditions dictate.

More Efficient Marketing Plan for Scrap to Be Sought

With respect to a marketing survey on scrap, which the institute in a resolution asked the Department of Commerce to undertake, Mr. Schwartz recommended that a commission to assist the Government be appointed, this commission to consist of scrap dealers, with representatives from consumers, producers and governmental agencies to the end that a marketing plan for the industry may be adopted on the basis of wider conservation of natural resources through the increased use and efficient distribution of scrap.

The results of this survey would help to point out, Mr. Schwartz contended, where there is uneconomic duplication of effort in scrap handling. He drew particular attention to conditions in Pittsburgh, Buffalo, Boston, New York, Philadelphia, Cleveland, Detroit, Chicago, Milwaukee, St Louis and Los Angeles, where, he said, "it would be economic to put some men on a pension and get down to business with the others."

The trade promotion bureau, whose organization was authorized by the convention, will undertake research problems, such as the development of markets for alloy steel scrap, and will also inaugurate an advertising campaign aimed to establish the seal of the institute as a guarantee that the organization is ready to back up the performance of contracts by its members and to secure observance of established standards of practice.

"In any program to stabilize an industry," said Mr. Schwartz, "a process of cleaning house must be undertaken. This process must be continuous in the scrap iron industry. It should involve the elimination of unfair and uneconomic practices through an educational program. It should involve the

NEW OFFICERS OF SCRAP INSTITUTE

Herman D. Moskowitz of the Schiavone & Bonomo Corpn., New York, was elected president of the Institute of Scrap Iron and Steel at its annual convention in Cleveland. Mr. Moskowitz has been secretary of the national organization during the past year.

Vice-presidents elected are: Frank Parker, Chicago; Myron A. Cohen, Cleveland; H. Silverstein, Charleston, W. Va.; Ben Cohen, Wilkes-Barre, Pa.; B. P. Williams, St. Louis.

Walter Erman, Chicago, is the new secretary. Thomas F. Kelly, New York, was elected treasurer.

An executive committee consisting of the above officers and the following members was chosen: Chairman, Phil W. Frieder, Youngstown; Michael V. Bonomo, Jersey City, N. J.; George B. Doane, Boston; William M. Hilb, Cincinnati; Darwin S. Luntz, Canton, Ohio; I. W. Solomon, Pittsburgh; Samuel N. Summer, Columbus, Ohio, and Ike Wilkoff, Youngstown.

H. D. Moskowitz

Nine new directors were elected to serve three-year terms, representing one-third of the entire board. New directors follow: Myron A. Cohen, Cleveland; M. Davidson, Stockton, Cal.; Jack R. Forcheimer, St. Louis; Abraham Isaac, Elizabeth, N. J.; Thomas F. Kelly, New York; Darwin S. Luntz, Canton, Ohio; Morris Schapiro, Baltimore; Harry Silverstein, Charleston, W. Va.; David Strauss, New York.

conquest of costs, because ignorance of costs and other standards is the most difficult thing to compete with." In connection with such an educational campaign, Mr. Schwartz suggested a code of business practices of his own, which was in part as follows:

> I WOULD find that it is cheaper in the end to dump objectionable scrap than to try to pass it off on a mill.
>
> I would consider carefully that profit does not always go with volume and that if there is a loss involved in a proposition I would rather let my competitor absorb the loss.
>
> I would not continue in business with my money anyone who is a "bad actor" or who brought disrepute upon myself and the industry.
>
> I would mind my own business.
>
> I would cooperate with my competitors.
>
> I would balance my service to the consumer very carefully with my service to the dealer or shipper whose scrap I am selling.
>
> I would not sell my shippers or my industry short.
>
> I would build my business on service alone.

Declares "Direct Dealing" to Be Trade's Most Serious Problem

In concluding his address, Mr. Schwartz said that "direct dealing between consumer and producer of scrap is the most serious problem facing the scrap iron industry. If it is said that the mills find it necessary to reduce their cost of raw materials in their competition with each other, then I say that our interests are the same as theirs. The service of the scrap iron dealer is to make scrap always attractive and economic for the consumer to use. Reduction of costs will be accomplished, not through disruption of the scrap iron industry, but by the selection of reliable dealers to serve them and by cooperating with the institute, whose program is to assure the free flow of scrap at economic prices, when needed, in the quantities needed and in accordance with specifications. Price is not a factor in the service of the scrap iron dealer, because the law of supply and demand, the relation of scrap to pig iron and other factors beyond the control of the dealer will govern the price.

"Reciprocal agreements will not gather the scrap. Direct dealing will not revive an industry when it is needed by the steel mills, once its organization has been scattered, its machinery scrapped and its incentive stifled."

Progress Reported on National Scrapping of Automobiles

The institute's committee on scrapping of old automobiles reported progress toward the setting up of a nation-wide program for scrapping 3,000,000 automobiles annually, but details of the program are still to be worked out, and the aid of the automobile industry will be required. Definite recommendations are soon to be made to the National Automobile Chamber of Commerce.

Scrapping of 3,000,000 cars annually, it was said, would yield about 1,500,000 tons of iron and steel for remelting. Not more than 500,000 automobiles are now being scrapped each year, it was estimated, and the reason that more are not systematically dismantled is that the work cannot now be done at a profit.

Costs, Arbitration and Other Subjects Discussed

In a round table discussion on costs of handling scrap in yards, papers on various phases of the subject were presented by M. V. Bonomo, Jersey City, N. J.; Harry N. Cohn, Butler, Pa.; Lee J. Workum, Portsmouth, Ohio, and F. H. Figsby of Ernst & Ernst, cost accountants, New York.

A luncheon discussion on arbitration also was held. The Institute of Scrap Iron and Steel is one of the few organizations in the country which settles all of its disputes by compulsory arbitration. It was pointed out that thousands of dollars in legal fees have been saved to members in the past year by the adjudication of controversies through the arbitration machinery which the institute has set up.

There were also round table discussions on traffic matters, on research work and on chapter welfare. A technical session occupied an entire afternoon and was featured by a motion picture presentation of the manufacture of steel by H. S. Anderson of the Youngstown Sheet & Tube Co., and by addresses on the use of scrap in malleable and gray iron foundries, malleable foundry practice having been discussed by H. A. Schwartz, director of research, National Malleable & Steel Castings Co., Cleveland, while gray iron foundry practice was explained by W. W. Kerlin of the Gray Iron Institute, Cleveland. These two papers will be abstracted in a later issue of THE IRON AGE.

The convention was concluded with a banquet, at which Carl D. Friebolin, former judge of the Common Pleas Court, Cleveland, was toastmaster, and addresses were made by Philip P. Gott of the United States Chamber of Commerce and Rabbi Barnett R. Brickner of Euclid Avenue Temple, Cleveland. Presentation of the first annual award of the institute to the one who has most usefully served the scrap industry during the year was made at the banquet to Benjamin Schwartz, the institute's director general.

Freyn Engineering Co., Chicago, reports the following sales: Two electric roll heaters to the Tokuyama Steel Sheet Co., Tokuyama, Japan; a continuous stockline recorder to the Tennessee Coal, Iron & Railroad Co., Birmingham, and 10 continuous stockline recorders and 16 pressure burners for hot blast stoves to the Amtorg Trading Corpn., New York, for Soviet Russia.

Industrial Briefs

Orders for range boilers in January increased to 51,217 units from 36,[illegible] last December, while the output totaled 54,772 and 33,299 respectively, according to reports received by the Bureau of the Census from 13 manufacturers.

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Conco Crane & Engineering Works, division of H. D. Conkey & Co., Mendota, Ill., has appointed C. P. Maxson, Auditorium Garage Building, Cleveland, and Starr-Carpenter, Park Building, Pittsburgh, as their representatives in the respective territories.

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"The Effect of Annealing on Chains" is the subject of an illustrated pamphlet of 45 pages issued by the National Safety Council, Chicago. It is the final report on the investigation of the effects of annealing on chains by the American Society of Safety Engineers.

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Mechanical stokers to the number of 597 with 42,795 hp. were sold in January, according to reports received by the Bureau of the Census from 24 leading manufacturers.

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Orders for enameled sanitary ware in January totaled 220,466 pieces, compared with 211,406 pieces last December, according to reports received by the Bureau of the Census from 21 manufacturers. Shipments were 276,056 pieces and 147,679 pieces respectively.

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Roy L. Jones Steel Co., 3132 West Fifty-first Street, Chicago, has been organized by Roy L. Jones, who has had extensive experience in the steel jobbing business, and will carry stocks of sheets, tin plates and terne plates.

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Diamond Machine Co., Providence, R. I., has appointed Cleveland Duplex Machinery Co., Penton Building, Cleveland, as its exclusive dealer in that area.

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The *Duriron News* for February, 1931, published by The Duriron Co., Dayton, Ohio, contains a description of the new chemical and research laboratory of the company.

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United States Pipe & Foundry Co. reports net earnings for 1930 of $2,881,046, compared with $2,581,229 for 1929.

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Easton Structural Steel Co. has moved its New York office to 801 Second Avenue.

Federal Decree Dissolves Bolt, Nut and Rivet Manufacturers' Association

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CONCERTED action among the members of the Bolt, Nut and Rivet Manufacturers' Association, Pittsburgh, in regard to several features of its activities is forbidden in a consent decree entered in the Federal Court for the Southern District of New York on March 17. The decree also provides for the dissolution of the present association within 90 days after its entry, but reserves to the defendants the right to form another association. Practices of the association which are specifically declared unlawful under the terms of the decree include its distribution plan, its methods of establishing base prices and its system of establishing basing points. In most cases, however, individual companies are not prevented from taking action along the above lines, the terms of the decree referring only to action "by mutual agreement, understanding, plan, device or contrivance."

Mr. Graham's Comments

In commenting upon the decree, Charles J. Graham, president of the association, who has been largely responsible for the group activities and plan of action, made the following statement:

"Throughout the past year, the Bolt, Nut and Rivet Manufacturers' Association has been engaged in conferences with the Department of Justice in respect to the legality of a portion of its plan of operation.

"In order to bring all of its operations in line with the present policy of the department, it has finally agreed to the entry of a consent decree which forbids concerted action among its members in regard to several features of its activities. The decree also provides for the dissolution of the present association within 90 days after its entry, but specifically reserves to the defendants the right to form another association.

"By this disposition of the matter, the industry avoids the expense and annoyance of a long litigation. Immediate steps will be taken to form an organization which will so operate as to be free from any criticism on the part of the Government.

"Final disposition of this case by agreement, on the basis described, is very satisfactory to the manufacturers."

Operation of Distribution Plan

The method of distribution followed by the Bolt, Nut and Rivet Manufacturers' Association under the direction of Mr. Graham was based upon an agreement between manufacturers and distributers that the former would solicit business only from a selected list of the larger buyers in the various districts. When smaller buyers sought to buy direct from manufacturers they were quoted prices substantially the same as those named by distributers in the territory. While the manufacturers reserved the right to quote any prices they saw fit to this class of buyers they gave the jobber assurance that the accepted resale price in the particular territory concerned would be kept in mind.

Individual Selection of Customers Is Lawful

While this plan was specifically condemned in the decree, it was further stated that "nothing herein contained shall be deemed to enjoin any defendant from individually selecting its customers in a lawful manner, or from using a list of such customers prepared by it individually."

In the matter of forbidding concerted establishment of base prices or setting up basing points on which products are to be sold, the decree did not differ essentially from other decisions affecting the status of trade association practice.

In defining the use of the words "concertedly" and "concerted," the decree specifically stated that they shall not be "construed to include merely simultaneous and or similar action independently taken on the part of two or more defendants." This is of particular importance to industry, as competing companies are not deprived of the right to follow the lead of some outstanding competitor in announcing its prices or price policies.

Text of Decree

The text of the decree as it applies to the bolt and nut association follows:

Now, therefore, it is ORDERED, ADJUDGED, and DECREED as follows:

That the words "concertedly" and "concerted," as used in this decree, shall mean by mutual agreement, understanding, plan, device, or contrivance, and shall not be construed to include merely simultaneous and or similar action independently taken on the part of two or more defendants.

1. That the combination and conspiracy in restraint of interstate trade and commerce, the various plans, agreements, and understandings among the defendants and the various activities in restraint of interstate trade and commerce with respect to bolts, nuts, and rivets, as described in the petition herein and which are hereinafter enjoined, and the restraint of such trade and commerce obtained thereby, are violative of the Act of Congress of July 2, 1890, entitled "An Act To protect trade and commerce against unlawful restraints and monopolies" commonly known as the Sherman Antitrust Act.

2. That the Bolt, Nut and Rivet Manufacturers' Association and its various agreements, plans, and operations described in the petition, and which are hereinafter enjoined, be, and they hereby are, declared illegal and in violation of said Act of Congress.

3. That defendant Association and the defendants who are members thereof, and each of them, and their officers, agents, servants, and employees, and all persons acting under, through, by, or in behalf of them, or any of them, or claiming so to act, be, and they hereby are, ordered and directed within ninety (90) days after the entry of this decree to dissolve and thereafter forever to discontinue said Bolt, Nut & Rivet Manufacturers Association, provided that this provision shall not be construed to prevent defendants from forming a different association.

4. That the defendants, and each of them, their officers, agents, servants, and employees, and all persons acting under, through, by or in behalf of them, or any of them, or claiming so to act, be, and they hereby are perpetually enjoined, restrained, and prohibited from engaging in, forming, joining or entering into, or becoming members of, any combination or association of manufacturers or sellers of bolts, nuts, or rivets which shall be unlawful or shall be engaged in unlawful conduct, or making any express or implied agreement to do, and from arranging, directly or indirectly, to engage or to continue to engage in any of the activities forbidden by this decree.

5. That the defendants, and each of them, their officers, agents, servants, and employees, and all persons acting under, through, by, or in behalf of them, or any of them, or claiming so to act, be and they hereby are perpetually enjoined, restrained and prohibited:

(a) From in any way carrying out any unlawful purposes of the combination and agreements hereinafter enjoined and from continuing, directly or indirectly, to perform, and from performing, any unlawful acts pursuant thereto.

(b) From agreeing with any defendant or other manufacturer of bolts, nuts, or rivets, to fix, establish or maintain, or concertedly fixing, establishing or maintaining, any price, price enhancement, price list, discount, extra charge, condition, term, arbitrary freight charge, average or arbitrary cost, percentage or amount of profit, or any other part of the ultimate price in the sale and delivery of bolts, nuts, or rivets.

(c) From concertedly maintaining, quoting prices from or using, any price

list, average or arbitrary cost or profit figures, or other instrumentality heretofore prepared by or under the ægis of the defendant association or by the collective action of any two or more defendants for use in connection with any of the activities forbidden by this decree;

(d) From concertedly organizing, maintaining or aiding in the operation of any system for promulgating, circulating, publishing or furnishing to any defendant any price list of or any information as to prices currently charged, to be charged or proposed to be charged or quoted for bolts, nuts, or rivets by any competitor of such defendant;

(e) From endeavoring, pursuant to agreement, to prevail upon or procure any defendant to sell bolts, nuts, or rivets at uniform or noncompetitive prices, or in any case at an enhanced or higher price, or not to sell at any lower or decreased or competitive price;

(f) From agreeing with any defendant, or other manufacturer of bolts, nuts or rivets, to establish or maintain, or concertedly establishing or maintaining, the basing point system which includes Pittsburgh, Pa., Cleveland, Ohio, Birmingham, Ala., and Chicago, Ill., as the only basing points for the quotation of charges on account of freight rates or the cost of transportation in the shipment of bolts, nuts, and rivets;

(g) From agreeing with any defendant, or other manufacturer of bolts, nuts, or rivets, to establish or maintain, or concertedly establishing or maintaining, any similar basing point system for the quotation of charges on account of such freight rates or cost of transportation;

(h) From agreeing with any defendant or other manufacturer of bolts, nuts, or rivets, to charge, or concertedly charging on account of such freight rates or cost of transportation any amount at substantial variance from the actual cost of such transportation;

(i) From individually or concertedly charging on account of such freight rates or cost of transportation any amount at substantial variance from the actual cost of such transportation where such charge or charges will result in an unlawful discrimination in price;

(j) From agreeing with any defendant, or other manufacturer of bolts, nuts, or rivets, to refuse, or concertedly refusing or concertedly failing to sell or quote prices on bolts, nuts, or rivets f.o.b. point of manufacture when requested so to do by the purchaser or prospective purchaser thereof;

(k) From agreeing to use, maintain, publish, circulate or promote the purposes of, or individually or concertedly, in any manner using, maintaining, publishing, circulating, or promoting the purposes of, the list entitled "List of Wholesale Distributors and Large Consumers of Bolts and Nuts in the United States." But nothing herein contained shall be deemed to enjoin any defendant from individually selecting its customers in a lawful manner, or from using a list of such customers prepared by it individually;

(l) From agreeing with any defendant, or other manufacturer of bolts, nuts, or rivets, to arrive at, or concertedly arriving at, any list of purchasers or prospective purchasers considered by the defendants to be entitled to purchase said products direct from the manufacturers, or considered by the defendants not to be entitled so to purchase said products;

(m) From concertedly arriving at or in any manner using any list of preferred or non-preferred purchasers or prospective purchasers of bolts, nuts, or rivets;

(n) From agreeing with any defendant, or other manufacturer of bolts, nuts, or rivets, to make, or, concertedly making, any differential in prices charged or quoted to different purchasers or classes of purchasers of products;

(o) From agreeing to make, or directly or indirectly, individually or concertedly, making any unlawful discrimination in price against any purchaser or class of purchasers of bolts, nuts, or rivets;

(p) From agreeing with any defendant to charge, or concertedly charging or continuing to charge, purchasers not on said list entitled "List of Wholesale Distributors and Large Consumers of Bolts and Nuts in the United States" any sum greater than that charged other purchasers in similar transactions;

(q) From agreeing to withdraw, or to prevent sales effort by, or concertedly withdrawing or preventing sales effort by, salesmen of defendant manufacturers who have regularly solicited or who normally would solicit orders for bolts, nuts, or rivets from purchasers not on said list;

(r) From agreeing not to make, or concertedly failing to make, solicitation or effort of any kind to procure orders for bolts, nuts, or rivets from purchasers or prospective purchasers not on said list;

(s) From endeavoring, pursuant to agreement, to prevail upon any defendant, or to procure any defendant, to refrain from doing business with any purchaser or prospective purchaser of bolts, nuts, or rivets, or to refrain from soliciting such business, or to charge or quote such purchaser any particular price or increase in price;

(t) From making any agreement, or taking any concerted action, tending to prevent, obstruct, hamper, or restrain any defendant manufacturer from making sales to any purchaser or prospective purchaser;

(u) From agreeing with any defendant, or other manufacturer of bolts, nuts, or rivets, to sell or quote prices on, or concertedly selling or quoting prices on, bolts, nuts, or rivets to any purchasers or prospective purchasers only when requested so to do.

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Department of Justice Issues Statement on Bolt, Nut and Rivet Decree

WASHINGTON, March 17.—The so-called Graham plan of distribution was brought to an end today with the consent decree accepted by the Bolt, Nut and Rivet Manufacturers' Association and the Department of Justice, according to a statement issued by the department. The decree, consented to in the United States District Court in New York, it is pointed out by the department, followed the filing of a complaint under the anti-trust laws against the association, Charles J. Graham, its president, and 50 companies participating in its activities. The decree requires the dissolution of the association, the statement says, and provides injunctive relief against the continuance of various activities considered to be in restraint of interstate trade and commerce in the manufacture, sales and distribution of bolts, nuts and rivets. The statement explained that the members of the association produced most of the nation's supply of these commodities.

Continuing, the statement says: "The decree marks the end of the so-called 'Graham Plan' of distribution, which had to do with the selection by agreement of manufacturers and jobbers of the list of customers which would be given certain preferential treatment by the manufacturers. It forbids any and all use of the list of preferential customers previously prepared by defendants and enjoins them from concertedly arriving at any new list or concertedly arranging for the treatment that will be accorded to any customer or class of customers. The petition also charges and the decree forbids the fixing of ultimate prices.

The price-fixing structure, as dealt with by the petition and decree, was composed of basic price lists arrived at by agreement, uniform discounts and allowances, and a system of freight equalization involving the use of four basing points. Under the terms of the decree these material factors in the field of trade are left open to the free play of normal competitive forces and the defendants are enjoined from dealing with them by agreement or concert of action. Each defendant will remain free individually to determine its own selling prices, discount, and allowances. It may similarly arrange to sell its products f.o.b. point of manufacture or it may absorb all or a part of the freight charges as it may see fit, provided it acts independently. But it may not make use of a basing point system of quoting freight rates which will result in an unlawful discrimination in price."

The American Arbitration Association announces the publication of a code of arbitration practice and procedure, presenting for the first time in this country a standard, organized practice of arbitration now in use by business men and attorneys and which may be applied to the settlement of business controversies in any jurisdiction in the United States. The code will be distributed by the Commerce Clearing House, Inc., Loose Leaf Service Division of the Corporation Trust Co., and is the result of five years' experience in the American Arbitration Tribunal, in which 2500 parties and 500 attorneys have participated in the arbitration of controversies involving many millions of dollars and substantial rights. The tribunal is now effective in 1700 cities, with 7000 arbitrators serving without compensation when called upon.

The Outlook for Prices and Profits

By DAVID FRIDAY

WHAT will happen to prices and the price level during the period of business revival which is ahead of us in the next 18 months; and what effects will the new price situation have upon profits?

A decade ago, when we were in the midst of the depression of 1921, we often said to business men at meetings such as this that the whole generation of them who were 40 or under would have to be re-educated. They had learned to do business in a period of rising prices. From 1896 to 1920 wholesale prices had continued steadily upward with only minor interruptions. In the summer of 1920 they had reached a level over three and a half times as high as the one from which they started after the business depression of the nineties which culminated in the free silver campaign of 1896.

The experience gained during those 24 years was apt to be of small value in a period of falling prices. And falling prices, these men were told, would be the trend of things between 1920 and 1930.

Now this decade is behind us, and our expectations with respect to falling prices have been realized. For all the commodities which go to make up the Bureau of Labor Statistics index number for wholesale prices (there are 550 of them), prices are down to less than half the level which they reached and held during the first nine months of 1920. Practically all classes of commodities have suffered this same decline; there is no material difference between farm products and all other commodities.

Raw Materials Recover First

How much of a recovery from the present price level may be expected in the period of business revival which we have entered? It used to be a commonly accepted principle that business recovery brings a rise in commodity prices. But two observations are pertinent at this point. The first is that such a recovery seldom occurs, except in the raw materials, during the earlier months of improved business. It usually takes a sustained period of industrial activity to raise prices very much. The other observation is that this principle is

PRICES of raw materials will show some improvement; they have fallen much more than finished products.

The price trend for finished goods will be still lower during coming months.

But profits do not depend primarily on prices; they depend much more upon volume of production.

If total output for 1931 is no greater than it was last year, profits will be materially higher, despite the fact that prices for industrial products will, on the average, be lower.

Low-cost inventories, more efficient labor and management, reduced overhead and cheaper credit will more than offset the decline in prices.

based upon a study of what happened during the decades of rising prices. It is not so clear that the same thing must necessarily happen in an era during which the trend is generally downward.

We have had three considerable price recessions since 1920. The extent of the subsequent recovery after each of these was by no means the same. The first downward movement occurred between the summer of 1920 and the early months of 1922. It carried the level down from 167 to 92. Raw materials had turned up as early as the summer of 1921, but the continual fall of finished products had carried the level downward until the opening of the new year. When the latter turned up also the whole price level began to rise. The advance continued until March, 1923, but prices by no means rose to the level of 1920. The highest point which they reached was 105; this was less than two-thirds of the peak of the post-war boom three years earlier.

Another decline set in rather promptly, and continued for more than a year. When it came to a conclusion in June, 1924, prices stood at 95. It was in that month that news came of the great reduction in the Canadian wheat crop, and wheat began an ascent which carried it from $1.04 per bushel to $2.04 in the following January. Commodity prices again reached a level which was practically as high as that of the spring of 1923. This time it was the raw materials which carried the price level up. These, together with semi-manufactured articles, got to 108, while finished products were only 101.

For a whole year prices remained on approximately this level. Then in the spring of 1926 they settled a few points and stabilized at practically 100, where they stayed for eight months. In the closing months of that year they began receding once more and by the spring and summer of 1927 had fallen below 94, thus practically duplicating the lowest level of the depression months of 1921.

After hanging around this level for 14 months, prices turned up once more, and finally reached a level of 100 during the ever-increasing activity which characterized business in the autumn of 1928. They remained here only a single month, after which they dropped once more and, despite all the increased output and demand of 1929, never got above 98. This peak was reached in July of that year. A renewed decline came with the recession in business and they fell steadily to December, 1930, when they reached a new low level for the post-war period at 79. The surprising thing about these recent price movements is the fact that the unprecedented volume of production and trade which characterized the boom of 1929 was not sufficient to raise the level to the peak which prices reached in 1925 and 1923; and it left them at only 60 per cent of the 1920 highs.

1929 Prices Below Those of 1921

If we consider the commodities other than farm products and food by themselves, the results are even more startling. Their fluctuations have been as follows during the last ten years:

High, April to August, 1920	171
Low, August, 1921	97
High, March, 1923	110
Low, July to October, 1924	98
High, November, 1925	104
Low, April to July, 1927	93
High, September to December, 1928	94
Low, January, 1931	78

These commodities are the products

*Abstract of an address before the National Association of Waste Material Dealers, Inc., at Chicago, March 18.

of forestry, mining and manufactures, as distinguished from agriculture. They are not subject to the vicissitudes of wind and weather; and they may be fairly said to represent the effects of those forces which are under human control, unaffected by fortuitous climatic conditions. They show that all the business activity of 1929 was not sufficient to raise the level of these commodities more than a point. The peak of productive output, measured in physical units, was reached in June, 1929. At that time these commodities stood at exactly 93.1, which was four points under the lowest level reached in 1921.

It is clear from this last table that prices do not always rise with business revival. If the rise of business activity which culminated in June, 1929, raised prices by only a point, from the lowest level which they had reached in the post-war period, then it is at least possible that prices should remain on their present level during the next business revival. It may help us to understand this situation better if we examine the causes which brought about this recession of the last decade.

Greater Output Keeps Down Prices

The Government takes a census of manufactures every two years. The one for 1929 has recently been made public. Any one who studies the course of manufacturing industry between 1919 and 1929 will find there one of the most potent causes for the decline in industrial product. It reveals the fact that all manufacturing establishments in the United States taken together actually employed 3 per cent fewer wage earners in the latter year than ten years earlier. But we know from the index of physical production which was first prepared by the Census and is now continued monthly by the Federal Reserve Board, that output has increased 42 per cent. It must be perfectly clear that when the efficiency of the productive factors increases after this fashion so that it takes fewer and fewer hours of labor to bring forth the same volume of output, either wages must rise or prices must fall, if profits remain at normal.

The situation in the mining industry has been similar to that in manufacturing, and agriculture also has been moving in the same direction. There are 12 per cent fewer people on farms than there were a decade ago. But the output in bushels, gallons, dozens and pounds has increased 20 per cent. There are actually fewer people on farms today than there were at the beginning of the century 30 years ago. But agricultural production has increased fully 50 per cent.

Wage Advances Have Not Offset Lower Costs

Money wages have not risen rapidly enough to offset the great decline in the cost of production which this increase in efficiency has brought about. Between 1919 and 1929 there was an actual increase in the money wages of manufacturing labor. The average worker took home in his pay envelope a total of $1,306 in the latter year as against $1,163 in 1919. This was an increase of 12 per cent per worker, as against a 46 per cent increase in his output. Under these conditions the competition among manufacturers brought about a decline in prices. While their output was 42 per cent larger, the *value* was up only 12 per cent. This shows a very marked decline in price per unit of production.

There is every evidence that this increase in efficiency and in output per worker will continue to grow in the future. Every period of business recession brings about a marked improvement in this respect; the present one is no exception to that rule. In view of this fact, there is little likelihood that we shall witness any marked rise in prices, at least for industrial products. It is probable that there will be an improvement in the prices of raw materials; they have fallen much more than finished products. It is not difficult to put together a group of such commodities whose price has fallen 50 per cent during the last two years. Practically all of those commodities whose prices had been maintained by stabilization pools come under this category. Coffee, rubber, silk, sugar, wool, nitrates—all of these are at prices which are probably below cost of production. They will see some advance, but it will be only moderate, and will be very far below the figures which the sponsors of stabilization had dreamed of, and in part, realized.

For manufactured products, the price trend will certainly be still lower during the coming months. They have fallen less than have raw materials. Their costs have declined in a marked degree. The fall in raw material prices has reduced that element of cost; the efficiency of labor has improved so much that the wages cost per unit of output is less; manufacturers have cut down overhead; and the credit which they must borrow is cheaper. Under these conditions they will compete vigorously for business, and in the process will reduce prices still further. The same holds true in even greater measure for mercantile establishments and retail prices.

Profits Depend on Volume More Than on Prices

What effect will all of this have upon profits? To the business man and to the man in the street profits depend primarily upon prices. This is a mistaken notion. A comparison of profits and prices at the beginning of this last decade, which we have traced here, with those of 1929 shows clearly that the forces which determine profits are only in small measure comprehended within the movement of prices; and that profits do not fluctuate with changes in the price level. They depend much more upon the volume of production.

If one had told business men in 1922 that the price level in 1929 would be lower than any which had prevailed in the lowest month of 1921, they would have been very pessimistic indeed about the outlook for profits. For that depression year had seen profits at zero, after paying taxes and interest and charging a depreciation. This was generally attributed in the popular mind to the fall in the price level which occurred between the summer of 1920 and the autumn of 1921. The year 1929 did, as a matter of fact, have an average price level three points below the lowest month of 1921, and it was 10 points below the average of that year. Yet the profits of 1929 were practically the highest on record, and exceeded by far those of 1920. In fact, the year 1930, with an average price level of 85 for industrial products, will show profits equal to those of 1920, when prices averaged 161.

The answer to the puzzle is to be found in the relative volume of production in these various years, and in the efficiency of labor and management. Nineteen hundred and twenty had been the peak year of industrial output when it attained a level of 87 for the 12 months. Nineteen hundred and twenty-nine reached a level of 119, and even the depression year of 1930 averaged 95. Factory payrolls, on the other hand, reached their peak in 1920 at 118, and stood at only 107 in 1929. They were down to 87 in 1930. These facts explain the maintenance of profits in the face of the great decline in prices.

With the revival in the volume of productive activity, profits will once more rise. If the total output for 1931 is no greater than it was last year, profits will be materially higher despite the fact that prices for industrial products will, on the average, be lower. Producers are starting the year with low-cost inventories, with more efficient labor and management, with reduced overhead and cheaper credit. These elements will more than offset the decline in prices.

Steel Barrel Manufacturers Operate at Low Rate

Shipments of steel barrels by members of the Steel Barrel Manufacturers Institute represented in January only 27.2 per cent of the potential capacity of the producing plants. Capacity for producing I. C. C. barrels was engaged to only 7.2 per cent, while that for light barrels was employed at an average of 32.8 per cent. Total shipments aggregated 247,045 barrels during the month.

Unfilled orders Feb. 1 amounted to 589,671 units, or enough for about 10 weeks' operation at the January rate. The volume of business in January was given as $602,170.

Urges Silver Conference

Francis H. Brownell Proposes Plan to Effect World Stabilization of White Metal

"STABILIZATION of Silver Without Legislation" was discussed at the annual meeting and dinner of the New York chapter, American Institute of Mining and Metallurgical Engineers, March 12, by Francis H. Brownell, chairman of the board, American Smelting & Refining Co.

Mr. Brownell outlined his plan for an international conference on this subject, which he believes other nations would be willing to attend. Such a conference should include as many governments as possible, but especially the United States, Great Britain including India, and France including Indo-China. Its objective would be an agreement that no sale of silver by a government would be made for a stated period, or until further notice, at less than some fixed price.

In a pamphlet recently prepared by Mr. Brownell he mentioned 50c. an ounce as a possible selling level. This comparatively high price, he said, had been criticized in certain quarters, although he had quoted it only as an example, the important factor being stability of the silver price at some determined minimum level.

Although the important financial nations are on a gold basis, a large part of the world's population still saves and transacts business in silver, chiefly China, India and Indo-China. In gold standard countries of Europe, especially in the Central and Southeastern nations, the population of small means has seen the currencies of Russia, Austria and Germany become worthless and, with but little confidence in the national currencies, uses silver as a medium for savings.

An international effort to stabilize the price of silver, he pointed out, would in no way interfere with the establishment of the gold standard in all nations, but a stable price for silver is necessary to prevent eventual wiping out of the savings of millions of the world's population. In addition to the recent Senate resolution requesting the President to call an international conference on silver, he mentioned that a number of the silver-producing States in the West had passed similar resolutions.

There is an impression, he said, that the United States is the one world power chiefly interested in silver. This impression changes, he said, when to foreign mine production is added the stocks of silver being disposed of by the Government of India, and the 4,000,000,000 oz. of silver estimated to be held by the population of India as savings.

More Beehive Coke Made in February

Preliminary estimates for production of beehive coke, made by the United States Bureau of Mines, place the February total at 169,600 net tons. This shows a gain of about 4 per cent from the January total of 163,000 tons, but is 40 per cent below the 281,000 tons of February, 1930.

Bituminous coal made in February is given as 31,417,000 tons, a drop of about 19 per cent from the 38,542,000 tons in January. Anthracite coal mined in February was 5,391,000 tons, a drop of 12½ per cent from the January total of 6,157,000 tons.

Pulverized Coal Rate Increases Cancelled

WASHINGTON, March 13.—The Interstate Commerce Commission has ordered cancellation of tariff schedules proposing increased rates on ground or pulverized coal, in carloads, from points in the Pittsburgh and Johnstown, Pa., groups to New England destinations. The increase was proposed by cancellation of an exception to the classification providing rates of 70 per cent of sixth class, minimum 50,000 lb. To most points in New England the rate from the Pittsburgh and Johnstown groups would have been increased to 30½c. from 21½c. per 100 lb.

Protest against the schedules was made by the Foundry Supply Manufacturers' Association, Cleveland. Ground coal is mixed, one part with nine parts of sand, and used to obtain a better surface finish on castings.

Steel House Construction Is Progressing

WASHINGTON, March 17.—Calling upon President Hoover last week, following an extensive coast-to-coast trip studying business conditions, Charles F. Abbott, executive director, American Institute of Steel Construction, New York, said in part:

"The depression through which we passed in 1930 is developing new materials and new methods in construction. During the past year construction ranked first in the markets for steel. We are finding new uses for steel in construction work and these new uses are proving so satisfactory that we expect to continue to develop the markets even after conditions are restored to normal."

Referring to certain improvements in building construction, he said, "The industry is endeavoring to develop an insulating and sound-proof wall-board from slag, the waste material from the furnace. Blown into a fiber and pressed into boards, it will have a consistency permitting one to drive a nail through it. But it will be absolutely fire-proof. With materials such as this, and by using permanent steel framing, we can build residences of steel, upon which loans are being made with far less risk than is usual in this class of loans. A number of constructors are today starting in this business, and we anticipate tremendous interest in this improved type.

"Steel residences have been developed in Germany and France with success. British experience was not so happy. The builders in the United States hope to avoid all the engineering mistakes made abroad. We feel that steel residences must not alone be better than residences constructed of other materials, but must be made just as cheaply."

Mr. Abbott spoke of considerable progress of the industry in the design of steel bridges, traffic viaducts and steel dams, and concluded by saying that the steel construction industry has been especially fortunate during the period of depression, the decline in this business during 1930 having been far less than the decline in other branches.

26 Ships for Ocean Trade Under Way March 1

WASHINGTON, March 17. Twenty-six vessels for ocean trade, costing in the aggregate $116,838,324, were under construction in American shipyards March 1, and in addition five vessels were being reconstructed for overseas trade at a cost of $8,838,850. When completed the majority of these vessels will be operated over routes covered by ocean mail contracts awarded under the Jones-White law.

Since creation of the original construction loan fund of the Shipping Board in 1923, loans have been made on 42 vessels completed for domestic and foreign trade. The total cost of these vessels was $78,875,319, of which the Shipping Board advanced $51,188,614.

According to the monthly report of the Shipping Board's Bureau of construction, vessels under construction average about 33 per cent complete.

More Trackwork Shipped in February

Shipments of trackwork for T-rail track of 60 lb. and heavier amounted in February to 6321 net tons, according to the American Iron and Steel Institute. This is an increase of 12½ per cent over the January total of 5626 tons and is the largest month's output since last August. It is, however, only slightly more than half the 12,524 tons shipped in February, 1930, and is much the smallest February tonnage ever reported.

Machine Tool Business Continues to Drift

No Marked Improvement in Sales Has Developed —Government Orders Outstanding

ALTHOUGH the machine tool market continues to drift along at about the volume of business that was done in January and February, with no major buying movement in sight, the trade derives encouragement from the fact that some lines of industry that normally are fairly good buyers of tools are showing a pickup. Better conditions in the textile industry have resulted in inquiries from textile machinery builders, one of whom has bought 11 engine lathes. Makers of canning machinery, seeing a good business this year in tin cans for food packing, are buying a few tools. Electrical refrigerator makers also are busy, though they have not needed new shop equipment. Another active line is the building of steel mill equipment, which promises to keep going at a good rate for some time to come.

The Federal Government is taking bids on a good many tools and has placed some orders. The Aircraft Corps, War Department, Dayton, Ohio, has awarded 17 lathes, on which it recently took bids. The Navy Department will take bids on March 24 and 31 on quite a number of items of equipment for various navy yards and naval air stations.

Automobile manufacturers and the railroads are far below normal in their machine tool purchases. The Chicago Great Western has had bids on a list, but has taken no action. The Santa Fe has added a few items to a recent list of tool requirements, but it is not certain as to how soon orders will result.

The monthly index of machine tool orders, compiled by the National Machine Tool Builders' Association, turned slightly upward in February. There was an upturn in September, 1930, and another in December, last, but except for these the trend has been downward since March, 1930.

February's index figure was 83.7 per cent of the base 100, which represents average shipments of 1922, 1923 and 1924. The January figure was 66.9 and that for December was 68.8. According to the machine tool organization, it appears that the November figure of 60.4 marks the low point in orders for the current business cycle.

The three months' moving average, aided by the February sales totals, moved up to 73.1 from 65.3 at the end of January, the February figure being identical with that for December.

The best recovery in February was made by those companies which the machine tool association classifies as "B," whose base period shipments range from $10,000 to $50,000 a month.

Unfilled orders at the end of February rose to the December level, and were 2.78 times the current rate of shipments, showing a somewhat better ratio of unfilled orders to shipments than has existed for some months.

New York

While the volume of machine tool buying continues at about the January and February levels, improvement is beginning to appear in some lines that are normally large buyers of tools. Better conditions in the textile industry are bringing some inquiry from textile machinery manufacturers; in the past week a Providence, R. I., plant placed 11 engine lathes.

Electric refrigerator output is steadily advancing, and the General Electric Co., which plans to reach a capacity of 10,000 refrigerators a week, is now producing 8800, while the Springfield, Mass., plant of the Westinghouse Electric & Mfg. Co. is turning out 1000 a week. Although the Schenectady, N. Y., producer needs no additional equipment in its refrigerator department, it has been buying some special tools for other divisions. The canning industry continues at a high rate of operation and makers of canning machinery have been small buyers of tools.

Washington

The Bureau of Supplies and Accounts, Navy Department, will open bids March 31 on a motor-driven 30-in. x 8-in. single surfacer for delivery at the Naval Academy, Annapolis, Md., and a motor-driven universal metal-cutting band saw machine for delivery at Hampton Roads, Va.; also a ball-bearing variety saw bench, Naval Air Station, Seattle; motor-driven universal milling machine, Hampton Roads, Va., or f.a.s. vessel, Pier 44, San Francisco; motor-driven pinking machine, Hampton Roads, Va., or f.a.s. vessel, Pier 32, San Francisco; 6-in. x 6-in. high-speed, motor driven hacksaw, Naval Air Station, Seattle; 10-ft., hand-operated, bending brake machine, Hampton Roads, Va., or f.a.s. vessel, Pier 32, San Francisco. And on March 24 on a 7-in., floor type horizontal drilling, milling and boring machine for the Philadelphia Navy Yard.

Pittsburgh

The volume of orders showed no appreciable change the past week and new inquiry was lighter. March business is hardly equaling February levels. Industrial activity in this district has advanced since the beginning of the year, but most companies seem to be resuming or increasing operations without buying much new equipment.

Makers of heavy machinery are still busy. One large company in this district has larger unfilled orders than a year ago, and at that time it was entering the most profitable year in its history. No new mills have been announced recently, although the Jones & Laughlin Steel Corpn. is buying equipment from time to time in

connection with its extensive plant improvement program.

Chicago

March so far has been quiet from the viewpoint of machine tool sales, and there are no indications for much betterment. Fresh inquiries, not in large volume, turn into orders only on rather rare occasions. The list of the Chicago Great Western is typical of the drift of the market. When this was first issued the trade understood that quick action would be taken, but so far this business remains unsettled. A bright spot appears in addition to the Santa Fe list, which is augmented by a punch and shear, a 600-ton wheel press, a 12-in. bench drill, a Bliss press and a motor-driven grinder for Bakelite wheels.

New England

Sales by machine tool dealers are few and generally for small cost equipment. New inquiries are scarce. There is some buying of parts, but even this business is limited. Occasionally a used tool dealer disposes of a lathe, drill press, power saw or some inexpensive tool, but only at a price concession and often has to take equipment as part payment. New England machine tool builders generally are no more active than a month ago.

Cincinnati

Small orders from scattered sources continue to drift in, but no trend toward a real buying movement is apparent. Users, however, are still showing interest in prices. Production remains at a low rate.

Milwaukee

Machine tool business is maintaining a moderate volume, with inquiry fair and prospects for sales favorable. It is considered significant that the automotive industries are becoming more prominent both as to inquiry and sales. The dearth of industrial expansion in general continues to dwarf demand for equipment and business consists largely of replacements. A fair demand is noted for tool room equipment. The specialty departments of local tool plants are perhaps the busiest of all. Used tools are in moderate demand, especially the lighter equipment.

Cleveland

Machine tool business was very light the past week. So far this month the volume has not been up to that in February. Inquiry continues fair, but prospective buyers are deferring purchases. General conditions in metal-working lines have not improved sufficiently to encourage plant owners to purchase equipment they will need when operations get back to near normal. The Aircraft Corps, War Department, Dayton, Ohio, has awarded 17 lathes against its recent inquiry. This business went to two manufacturers.

New York

EFFECTIVE May 1, Cornell & Underhill, 311 Spring Street, New York, manufacturer of iron pipe, etc., will take over new one-story plant at Jefferson, Madison, Thirteenth and Fourteenth Streets, Hoboken, N. J., recently completed at cost of over $150,000. Present works are being removed to new location and capacity will be increased.

New York Edison Co., 4 Irving Place, New York, and Niagara-Hudson Power Corpn., Electric Building, Buffalo, are arranging construction facilities for interchange of power, to cost about $12,000,000. Last noted company will build a steel tower transmission line from Greenbush power substation, near Albany, N. Y., to Peekskill, to operate at 110,000 volts, and thence to Poughkeepsie, to operate at 132,000 volts; power substation will be built at latter place, to cost over $1,000,000 with machinery. This part of program will cost $10,000,000. New York Edison Co. will expend $2,500,000 in constructing and increasing capacity of steel tower lines north of Hudson power substation at Yonkers, N. Y., for connection with Poughkeepsie system. Work is scheduled to be completed by close of year. Following, it is proposed to construct another steel tower line between Rotterdam power substation, near Schenectady, N. Y., to new substation at Poughkeepsie. Engineering departments of both companies will be in charge.

Department of Hospitals, Municipal Building, New York, plans early call for bids on general contract for a one-story automobile service, repair and garage building at city hospital, Welfare Island, to cost over $125,000 with equipment. H.

INDUSTRIAL CONSTRUCTION

Airport and Gas Line Projects Are Features of the Week's Construction News

INDUSTRIAL plant construction projects continued to be announced at a rapid rate in the past week. The total for the week was $8,426,000 for this class of construction, which involves industrial equipment in its completion and which represents the employment of labor in future operation as well as in immediate construction.

Among the sizable industrial projects which made up the week's total was an $850,000 item for the construction of a new plant at Oakland, Cal., for the Owens-Illinois Glass Co. Another was for a new milling and concentrating plant for the Ord Copper Co., near Daggett, Cal., amounting to $2,000,000.

Projects for municipal and other airports took a sizable jump, the total for the week amounting to more than $4,000,000. Of these, the largest is the project of the city of Boston, calling for the immediate expenditure of $1,250,000 for a municipal airport on Governors Island. Later expenditures on this project, to bring it to completion, will involve close to $10,000,000.

Oil and gas pipe line projects totaled $8,750,000 for the week. The largest of these is to involve a $5,000,000 expenditure by the Virginia Gas Transmission Corpn., Charlottesville, Va., for a 200-mile gas pipe line from Covington, Va., to Washington.

The summary of current projects for the week is as follows:

Public utilities and power plants	$16,000
Industrial plants	8,426,000
Metal-working plants	1,245,000
Railroad improvements	1,000,000
Municipal improvements, airports, etc.	4,920,000
Total	$15,666,000

In addition to the above, school construction projects were higher than the average, amounting to $4,371,000.

Extending projects of public utility and other companies which will run through 1931 and beyond aggregate $35,750,000 for the week.

Robert Swartburg, 2 West Forty-sixth Street, is architect. Department also plans call for bids in May for similar two-story structure, 80 x 110 ft., at Brooklyn, to cost over $175,000 with equipment. LeRoy P. Ward, Inc., 295 East Forty-second Street, is architect for last noted building.

Superintendent of Lighthouses, Staten Island, N. Y., is asking bids until March 26 for four steel bodies for buoys, each with skeleton steel lantern tower and bottom counterweight, two to be 5 ft. diameter and 32 ft. long, and two, 3 ft. in diameter and 15 ft. long.

Triangle Fireproof Door Co., 784-88 Humboldt Street, Brooklyn, plans rebuilding of part of one-story plant recently destroyed by fire.

Holmes Airport, Northern Boulevard, Jackson Heights, Queens, has awarded general contract to Austin Co., 120 Broadway, New York, for airship hangar with repair facilities, to be used for airship of Goodyear-Zeppelin Corps., Akron, Ohio, to cost over $80,000 with equipment.

Bids will be received by Signal Supply Officer, Signal Section, Army Base, Brooklyn, until March 21 for splice couplings, pin plugs, tube sockets, binding posts, dynamotors, rail and shield assemblies, and other equipment; until March 30 for 70 to 150 switchboards.

Jacob Tayo, 176 Bradford Street, Brooklyn, and associates have organized Supreme Bed Spring Co., and plan operation of factory for manufacture of woven wire and other steel springs. Samuel Levine, 185 Essex Street, Brooklyn, is interested in new company.

Port of New York Authority, 80 Eighth Avenue, New York, plans call for bids on general contract in June or July for four-to-seven-story freight and industrial terminal, 200 x 800 ft., to cost over $7,500,000 with equipment. Abbott, Merkt & Co., 175 Fifth Avenue, are architects and engineers. Port board has arranged for a bond issue of $66,000,000 for new industrial enterprises.

American Colortype Co., 267 West Twenty-fifth Street, New York, has engaged Bullinger Co., 100 East Forty-second Street, architect and engineer, to prepare plans for extensions and improvements in recently acquired plant of Brighton Mills, Attwood, N. J., to cost over $75,000.

Mohawk Garage of New Jersey, Inc., 250 Park Avenue, New York, James V. Coyle, president, will proceed with superstructure for a five-story service, repair and garage building at Bergen Avenue and Academy Street, Jersey City, to cost over $450,000 with equipment. General contract was recently let to Fisher-Williams Corpn., 110 East Forty-second Street, New York. Charles Shilowitz, 26 Journal Square, Jersey City, is architect.

Metallo Gasket Co., 16 Bethany Street, New Brunswick, N. J., manufacturer of Metal gaskets, etc., has awarded general contract to Milltown Realty & Construction Co., Milltown, N. J., for two-story and basement addition, to cost close to $35,000 with equipment.

Archer & Baldwin, Inc., Main Street, East Bound Brook, N. J., manufacturer of electrical equipment, including reconditioning and repair works, contemplates rebuilding part of plant recently destroyed by fire, with loss over $65,000 including equipment. New York offices are at 126 Liberty Street.

Theodore M. Edison, 106 North Walnut Street, East Orange, N. J., son of Thomas A. Edison, West Orange, N. J., has organized Calibron Products, Inc., to operate a manufacturing and experimental works for electrical, mechanical and other equipment. Mr. Edison will be president and manager.

Cooper Alloy Foundry Co. has been organized with a completely equipped foundry at 159 Broadway, Elizabeth, N. J., and is specializing in production of corrosion and heat-resisting alloys, including chrome iron, chrome nickel iron, monel metal, etc. Company will operate with organization formerly with William J. Sweet Foundry Co., Newark, N. J., which has suspended operations. Complete line of Sweetaloy castings will be produced. Harry A. Cooper, formerly president William J. Sweet Foundry Co., is president of new company.

Philadelphia

CONTRACT has been let by Ajax Metal Co., 16 Richmond Street, Philadelphia, to Cramp & Co., Denckla Building, for two-story addition, 100 x 200 ft., for storage and distribution, to cost close to $75,000 with equipment.

Navy Department, Washington, has awarded general contract to Work Co., 1608 Walnut Street, Philadelphia, for an addition to mechanical shop at local Marine Corps headquarters, at price of $168,980.

H. W. West Foundry & Machine Co., Philadelphia, recently organized by Daniel H. H. Fyfe, 1416 South Penn Square, and associates, plans operation of local foundry for production of iron castings. Israel Stucki, 924 North Franklin Street, is interested in new organization.

Dominick Mancaterino, Philadelphia, agent of Allen Brothers, 420 South Sixteenth Street, real estate, has leased four-story building at 1116-26 South Eleventh Street, and will remodel for an automobile service, repair and garage building.

Benjamin L. Snyder, 5641 Woodcrest Avenue, Philadelphia, and associates have formed Snyder, Inc., capitalized at $25,000, and plan operation of local factory for production of mechanical and electrical appliances and equipment. Carson Snyder, same address, is interested in company.

Board of Education, Camden, N. J., contemplates installation of manual training equipment in new high school, to cost over $550,000. Davis & Dunlap, 1805 Walnut Street, Philadelphia, are architects.

James F. Malone, secretary, Department of Property and Supplies, Harrisburg, Pa., is asking bids until March 24 for hardware and electrical supplies and equipment for a six months' period.

Board of Water Commissioners, Sixteenth and French Streets, Wilmington, Del., is asking bids until March 31 for a pumping plant near Woodside, including three gasoline motor-driven pumping units and auxiliary machinery. S. N. Van Trump is chief engineer.

Keystone Laundry Machinery Co., Columbia, Pa., has been organized by Edwin M. Brown, 525 Chestnut Street, with a capital of $50,000, to operate a local plant for manufacture of mechanical laundry equipment and parts. James L. Davidson, same address, will be an official of company.

S. R. and S. C. Shaymaker, 1024 Marietta Avenue, Lancaster, Pa., have organized General Lock Corpn. and plan operation of local factory for manufacture of locks and hardware products. W. H. Smith, 522 Race Street, is interested in company.

Henderson's Brake Service, Inc., Forty-second and Walnut Streets, Philadelphia, has leased building at 3943-45 Elsey Street, for a new automobile brake repair and service works.

Buffalo

PLANS have been filed by American Elevator & Warehouse Co., 12 Childs Street, Buffalo, for a new grain elevator, with elevating, conveying, screening and other equipment, to cost $250,000.

Department of Mental Hygiene, State Office Building, Albany, N. Y., is asking bids until April 1 for elevated steel tank, pumps and other equipment for State hospital at Rochester, N. Y.

Hardinge Brothers, Inc., Elmira, N. Y., has been chartered with a capital of $450,000 and 4500 shares of stock, no par value, to operate a local factory for manufacture of electrical products. Frederick W. Swan, 628 West Church Street, and W. H. Mandeville, 709 West Water Street, Elmira, are principal incorporators.

East Aurora Chemical Co., East Aurora, N. Y., recently formed by Robert O'Neil, East Aurora, and associates, to manufacture industrial chemicals, etc., has leased plant property at 56 Paine Street, and will soon start operations.

Board of Education, Genesee Building, Buffalo, will receive bids until March 24 for equipment and supplies for schools for fiscal year, 1931-32, as per list and specifications on file at office of Frederick Becker, deputy superintendent, address noted. James Storer is secretary.

St. Regis Paper Co., Norfolk, N. Y., has leased one-story factory now in course of construction at Seattle, Wash., 140 x 150 ft., for establishment of new branch paper converting plant, to cost over $75,000 with machinery. Austin Co., Seattle, is general contractor.

New England

BUREAU of Yards and Docks, Navy Department, Washington, is asking bids until April 1 for three-story addition to naval torpedo station, Goat Island, Newport, R. I., to be used as an assembling shop.

Henkel & Son, Congress Street, Keene, N. H., manufacturers of manicuring implements and kindred steel specialties, are planning to rebuild part of plant recently destroyed by fire, with loss close to $25,000 including equipment.

C. F. Segee, 31 Connecticut Boulevard, East Hartford, Conn., and associates have organized Hartford Gas Appliance Co., Hartford, with capital of $50,000, to operate a local plant for manufacture of gas-burning equipment and appliances. K. R. Segee, Pleasant Valley, South Windsor, Conn., is interested in new company.

Town School Committee, Windham, Conn., is considering installation of manual training equipment in addition to high school to cost about $125,0000. Wilson Potter, 22 East Seventeenth Street, New York, is architect.

Cudina Beverage Co., Higganum, Conn., has awarded general contract to G. H. Birdsey, 2 Russell Street, Middletown, Conn., for two-story plant unit, 75 x 125

ft., to cost close to $45,000, with automatic bottling, conveying and other equipment. It will replace a unit recently damaged by fire. B. A. Benson is vice-president, in charge.

General Insulated Wire Co., Providence, R. I., has been organized by Salvatore Chiappinelli, 478 Branch Avenue, and associates, to operate local plant for manufacture of electrical wires and other wire products. Ernest Snider, Providence, will be an official of new company.

City Council, Boston, is arranging a loan of $1,250,000 for initial work in connection with municipal airport on Governors Island, recently leased from War Department, entire project to cost close to $10,000,000. Public Works Department, City Hall Annex, will be in charge.

Vermont Tap & Die Co., Lyndonville, Vt., recently organized, has begun operations in a local building for production of taps, dies and kindred engineering specialties.

Navy Department has placed an order for 25 observation airplanes, to cost $160,455, with Chance-Vought Corpn., East Hartford, Conn.

State of Connecticut has tentative plans for a trade school at Enfield, to cost $75,000 without equipment.

Bids will be taken next month on a two-story and basement boys' industrial school, 44 x 148 ft., at Meriden, Conn., to cost $93,600 with equipment.

American Brass Co. has plans for a new fine wire manufacturing plant at Ansonia, Conn., to contain 50,000 sq. ft.

South Atlantic

OFFICE of chief of engineers, United States Army, Washington, is asking bids until March 26 for a portable rock-crushing plant of 10-ton capacity.

Board of District Commissioners, District Building, Washington, plans installation of manual training equipment in new three-story and basement Hugh M. Brown junior high school, for which general contract has just been let to Arthur L. Smith & Co., 2539 Pennsylvania Avenue, N. W., to cost over $500,000. A. L. Harris, District Building, is municipal architect.

Virginia Gas Transmission Corpn., Charlottesville, Va., subsidiary of Columbia Gas & Electric Corpn., 61 Broadway, New York, plans a pipe line for natural gas supply from point near Covington, Va., to Washington, with several branch lines, totaling 200 miles, to cost over $5,000,000 with compressor stations and other facilities. Columbia Gas Construction Co., an affiliated organization, will be in charge of installation. Work is scheduled for completion within six to eight months.

Claxton Coca-Cola Bottling Co., Claxton, Ga., an interest of Coca-Cola Co., Atlanta, Ga., has plans for new two-story bottling plant, with installation of automatic bottling, conveying and other equipment, to cost about $65,000. Pringle & Smith, Norris Building, Atlanta, are architects.

City Council, Charleston, S. C., is planning organization of a municipal airport division to arrange for purchase of site and establishment of municipal airport, including hangar, with repair facilities and other field units, to cost $60,000. Thomas P. Stoney, mayor, is in charge.

Bureau of Yards and Docks, Navy Department, Washington, will receive bids until March 25 for a surface condenser, motor-driven condensate pump, air ejector and auxiliary equipment for naval training station, Great Lakes, Ill.

Kent Automatic Garage & Washington Market Corpn., 700 Southern Building, Washington, John W. Newman, manager, recently formed, has plans for multi-story service, repair and garage building, and three-story public market, with ice-making, refrigerating and other equipment, to cost over $2,500,000 with equipment. Structures will be located on block bounded by Tenth, Eleventh, H and I Streets, N. W. Boyd, Abel & Gugert, Architects Building, Philadelphia, are architects and engineers. R. T. Lipscombe, American National Bank Building, Richmond, Va., industrial engineer, is interested in project.

Milwaukee

ANNOUNCEMENT is made of organization of Wisconsin Art Bronze & Iron Co., Milwaukee, by former executives of Milwaukee division, General Bronze Corpn., formerly known as Wisconsin Ornamental Iron & Bronze Co. Quarters have been leased at 215-219 East Kreft Avenue and production will start next week. W. C. Schmeling, formerly assistant general manager, Milwaukee division, General Bronze Corpn., is president. Fred Van Kooy, vice-president, and A. R. Stark, secretary-treasurer.

Gillette Rubber Co., 793 Wisconsin Street, Eau Claire, Wis., has placed general contract with Hoeppner-Bartlett Co., 204 East Grand Avenue, local, for fourth story plant extension, 150 x 248 ft., to cost $85,000.

Common Council, Monroe, Wis., is taking bids until April 1 for construction and equipment of municipal sewage disposal plant with capacity of 350,000 gal. daily. Louis H. Kessler, Williams Bay, Wis., is consulting engineer.

Duluth, South Shore & Atlantic Railway, Duluth, Minn., has placed contract with Lake Shore Engine Works, Marquette, Mich., for complete hoist equipment for new $1,800,000 ore dock, with 150 pockets, at Marquette, work on which is about to start.

Chicago

BIDS have been asked on general contract by Bell & Howell Co., 1801 Larchmont Avenue, Chicago, manufacturer of motion picture machines, parts, etc., for a one-story top addition, to cost about $40,000 with equipment. Pond & Pond, Martin & Lloyd, 180 North Michigan Avenue, are architects.

Board of Education, Peoria, Ill., has authorized installation of four manual training shops in new three-story and basement junior high school to cost about $750,000, for which plans are being drawn by Hewitt, Emerson & Gregg, Peoria Life Building, architects.

Standard Welding Co., Waukegan, Ill., is planning to rebuild part of works recently destroyed by fire, with loss close to $40,000 with equipment.

Washburn-Crosby Co., Minneapolis, Minn., manufacturer of flour, cereals, etc., has awarded general contract to Jacobsen Brothers, 53 West Jackson Boulevard, Chicago, for a three-story mill, storage and distributing plant at Chicago, to cost over $85,000 with equipment. Edward Nordlie, 4825 North Carolina Avenue, Chicago, is architect.

Superior Metal Products Co., 211 Chestnut Street, St. Paul, Minn., manufacturer of milk cans and kindred metal goods, has awarded general contract to William Selby, 85 West Magnolia Street, for a one-story plant, 61 x 110 ft., to cost about $75,000 with equipment.

Board of Education, Minneapolis, Minn., plans installation of manual training equipment in new three-story and basement Ramsey Junior High School to cost $750,000, for which it is expected to ask bids on general contract in June. Ericson of Buildings, Division of Design, is architect. George F. Winrath is business manager.

Cranes, power equipment, conveying and other machinery will be installed in new plant at Sioux City, Iowa, to be built by Campbell-Taggart Associated Bakeries, Inc., Kansas City, Mo., to cost about $200,000. Winfield M. Campbell is chairman of board.

Detroit

ARRANGEMENTS have been made by Perfection Combustion Burner Corpn., Columbus, Ohio, manufacturer of oil and gas burners, for establishment of new plant at Jackson, Mich., where space has been leased in building of Knicker-bocker Mfg. Co. It is expected to have works ready for service in April. Company has authorized change of name to Combustion Products Corpn.

M. N. Hutton Co., Race and Factory Streets, Ypsilanti, Mich., recently formed with capital of $25,000 by Merl H. Hutton, Ypsilanti, and associates, plans operation of local factory for production of electrical products and equipment, including radio apparatus. Arthur R. Tefft, Ypsilanti, is interested in new company.

Board of Education, Midland, Mich., contemplates installation of manual training equipment in new three-story and basement school to cost about $375,000, for which plans are being prepared by R. V. Gay, Clinton Street, St. Johns, Mich., architect.

Northern Aircraft Corpn., Bay City, Mich., has taken over 70 acres near Mount Morris, Mich., for establishment of commercial airport, to include hangars, repair shops and other field structures, to cost over $85,000 with equipment.

Gray Register Co., 2850 East Woodbridge Street, Detroit, recently formed with capital of $100,000, plans operation of local factory for manufacture of pressed steel equipment, including register boxes, etc., and mechanical devices. Company is headed by W. Campbell Moore and John A. Germonprez.

Deveaux-Hall Motors Corpn., Grand Rapids, Mich., recently organized by Norman Deveaux, Oakland, Cal., and associates, has leased a unit of local plant of Hayes Body Corpn. for an assembling works for new automobile, to be known as "Deveaux-Six," and will begin operations soon. Hayes company has secured contract for bodies for new cars, also certain stampings and fenders, and will carry out production at Grand Rapids and Ionia, Mich., plants. Deveaux-Hall organization will also operate an assembling plant at Oakland, Cal., in former works of Durant Motor Co. Col. Elbert J. Hall is one of heads of new company.

Miller Corpn. of America, 1545 Temple Avenue, Detroit, has been organized by F. J. Waldecker, Dearborn, Mich., and

Emil Ritter, Detroit, to operate a local foundry for the production of iron and other metal castings.

International Conveyor & Washer Corpn., 1957 Beaufait Avenue, Detroit, has been organized by E. A. Jastion, W. A. Weimet and N. B. Morrish to manufacture conveyors, industrial washing machines, etc., and is now installing equipment.

Cleveland

PROPERTY is being secured by Owens-Illinois Glass Co., 905 Wall Street, Toledo, Ohio, at Oakland, Cal., as site for new plant, with power house, machine shop and other departments, to cost over $500,000 with machinery. William E. Levis is president and general manager.

George E. Rudolph, 6109 Quimby Avenue, Cleveland, architect, has plans for a two-story and basement automobile service, repair and garage building, 80 x 265 ft., to cost over $125,000 with equipment.

Harold H. Foltz, Akron, Ohio, and associates have organized H. H. Foltz Body Corpn., with capital of $20,000, and contemplate operation of local plant for manufacture of automobile bodies, including department for repair work. New company will be represented by Lightner & Hadley, Akron Savings & Loan Building, attorneys.

Alliance Mfg. Co., Alliance, Ohio, manufacturer of grass shears and lawn mowers, has purchased plant and business of Goodwin Mfg. Co., Hartford, Conn., manufacturer of similar products, and will consolidate. Headquarters of acquired company will be transferred to Alliance, while Hartford works will continue as a branch factory. Expansion will be carried out.

Industrial Rayon Corpn., West Ninety-eighth Street and Walford Avenue, Cleveland, has engaged Christian, Schwarzenberg & Gaede, 1836 Euclid Avenue, architects and engineers, to prepare plans for an addition for production of transparent viscose wrapping stocks, to cost over $250,000 with machinery.

Sandusky Metal Products, Inc., Sandusky, Ohio, recently organized by Henry McGlinchey, Sandusky, and associates, plans operation of local factory for production of line of metal goods. Company will be represented by David Perrin, Standard Bank Building, Cleveland.

Headquarters of Harrison-Walker Refractories Co., now planning for new plant near Portsmouth, Ohio, to cost about $50,000, are in Farmers Bank Building, Pittsburgh, and not at Cleveland, as incorrectly noted in these columns last week.

Pittsburgh

PLANS are being completed by Mayer Body Corpn., 6179 Frankstown Avenue, Pittsburgh, manufacturer of automobile bodies, for a one and two-story addition, 50 x 100 ft., and 50 x 100 ft., to cost over $65,000 with equipment. Lake & Davidson, Negley Building, are architects. W. G. Mayer is president.

Oil City Boiler Works, Inc., Oil City, Pa., is arranging a fund of $50,000 for expansion.

Westinghouse Valley Sign Mfg. Co., Wilmerding, Pa., has been organized with capital of $25,000 and headquarters at 98 Bridge Street, to operate a local plant for manufacture of electric signs and displays. John Volpe and John M. Clein, 116 Bridge Street, are incorporators.

Kelly Axe & Tool Co., Charleston, W. Va., a subsidiary of American Fork & Hoe Co., Keith Building, Cleveland, is planning installation of machinery for a shovel-manufacturing department for initial output of about 1200 shovel units a day. It is expected to have new division ready for service in May.

United States Engineer Office, Pittsburgh, is planning early call for bids for construction of twin locks at Rostraver on Monongahela River.

Gulf Refining Co., Frick Annex, Pittsburgh, has applied for permission to construct a floating dock on Ohio River, near Parkersburg, W. Va., 50 ft. long and 25 ft. wide, with pipe lines and other equipment for oil storage and distribution. Company engineering department is in charge.

Standard Automatic Products Co., 611 West Main Street, Corry, Pa., is considering new one-story plant, to cost about $15,000 with equipment.

George Chesmark, West Seventh Avenue and Mill Street, Tarentum, Pa., and associates have organized Springdale Foundry Co., with capital of $50,000, to operate a foundry at Springdale, for production of iron, steel and other castings. George Sakala, Tarentum, will be an official of new company.

St. Louis

FOLLOWING recent organization of Inland Iron Works Co., Joplin, Mo., by officials of Joplin Machinery & Electric Co., Joplin, Mo., arrangements have been made to take over plant and business of United Iron Works, Inc., Okmulgee, Okla., which will be continued as branch plant. Company will specialize in production of iron and steel products, as well as bronze and brass castings, etc. L. F. LeHew is president of Inland company.

City Council, Tulsa, Okla., has plans for a two-story and basement hangar at municipal airport, 100 x 120 ft., with repair facilities, to cost about $35,000. John T. Blair, Exchange National Bank Building, is architect.

Reynolds Mfg. Co., Springfield, Mo., manufacturer of iron castings, etc., has plans for expansion and will soon begin installation of equipment for production of aluminum castings.

City Council, Lincoln, Neb., has called special election on April 7 to approve bond issue of $2,400,000 for extensions in municipal waterworks, to develop additional source of supply from Platt River, near Ashland, Neb., to include pumping and other power equipment, pipe lines, etc. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is consulting engineer.

Cimarron Utilities Co., Borger, Tex., is planning installation of a natural gas system at Boise City, Okla., including pipe lines, compressor station, etc. C. R. Stahl is manager.

Western Service Corpn., Oklahoma City, Okla., has work under way on extensions in natural gas system to cost close to $250,000. Pipe lines will be extended and stations installed for service at Minco, Amber, Union City and other communities.

Missouri Rolling Mill Corpn., 6800 Manchester Avenue, St. Louis, is completing a new plant for manufacture of steel transmission towers, to include a department for commercial galvanizing. Main building will be 62 x 260 ft., with extension 80 x 100 ft., and additional structure 45 x 65 ft. Expansion represents investment of $100,000.

Cincinnati

PLANS have been completed by Advance Foundry Co., 100 Parnall Avenue, Dayton, Ohio, for a one-story addition for storage and distribution, to cost about $25,000 with equipment. C. A. Hoek, Realty Building, is architect. Company also has plans by same architect for addition to foundry unit.

J. P. Rasmussen, Springfield, Ohio, and associates have organized Brakes, Inc., with capital of $60,000, and are considering operation of local service and repair works for automobile brakes, etc. Ray Kauffman, Springfield, is interested in new company.

Contracting Officer, Wright Field, Dayton, Ohio, is asking bids until March 25 for a centrifugal pumping unit, operated by gasoline engine or gasoline engine and steam turbine.

Common Council, Livingston, Tenn., is planning extensions and improvements in municipal electric light and power plant, including installation of engine and generator unit, and auxiliary equipment.

American Suppliers, Inc., Lexington, Ky., a subsidiary of American Tobacco Co., 111 Fifth Avenue, New York, has awarded general contract to Carter Construction Co., Greenville, N. C., for a new storage and distributing plant on 30-acre tract of land, to include boiler plant and other units, to cost about $450,000 with equipment.

Louisville Gas & Electric Co., Louisville, has acquired property of Central City Gas Co., Central City, Ky., and will consolidate. Purchasing company plans expansion, including pipe line construction.

Board of Education, Dayton, Ohio, plans installation of manual training equipment in new junior high school, to cost about $300,000, for which bids will be asked on general contract early in April. Herman & Brown, Reibold Building, are architects.

Tennessee-Eastman Corpn., Kingsport, Tenn., manufacturer of cellulose products, a subsidiary of Eastman Kodak Co., Kodak Park, Rochester, N. Y., has awarded general contract to Ridge Construction Corpn., 335 Lewiston Avenue, Rochester, for one and four-story addition, 100 x 380 ft., to cost close to $1,000,000 with machinery.

Gulf States

PLANS are being considered by Yount-Lee Oil Co., Beaumont, Tex., for a pipe line from Lathrop field, Gregg County, to a point on Gulf Coast, totalling about 210 miles, to cost close to $3,000,000 with pumping stations and other operating facilities. Company is negotiating for purchase of Farrell-Lathrop wells and leases in oilfield noted.

Morgan Utilities Co., Inc., Longview, Tex., has plans for a one-story, electric-operated ice-manufacturing plant, 75 x 100 ft., to cost over $100,000 with machinery.

Construction Quartermaster, Barksdale Field, Shreveport, La., has received low

add from Ashton Glassell Co., Shreveport, for maintenance and repair shop, warehouse and distributing unit, and automobile service and garage building at local field, at $86,842, exclusive of equipment.

N. J. Hebert, 1748 Sixth Street, Port Arthur, Tex., and associates are considering a one-story ice-manufacturing plant, to cost close to $40,000 with machinery.

Atlas Pipe Line Co., Shreveport, La., care of E. R. Ratcliff, president, Shreveport, recently organized, is planning construction of a pipe line for crude oil service from Kilgore-Joinersville-Longview oilfields, east Texas, to Shreveport and vicinity, with pumping plants, to cost over $650,000. Mr. Ratcliff is founder of Louisiana Oil Refining Co., Shreveport. Samuel D. Hunter, Shreveport, vice-president of Atlas company, is also head of Pelican Natural Gas Co.

Fort Stockton Independent School District, Fort Stockton, Tex., contemplates installation of manual training equipment in new three-story high school to cost about $125,000, for which bids have been asked on general contract. David S. Castle Co., Alexander Building, Abilene, Tex., is architect.

Premier Granite Co., Llano, Tex., has purchased quarry properties of Painted House Granite Co., near Llano, and will carry out expansion. New quarrying, hoisting, conveying, loading and other machinery will be installed; finishing equipment is also being considered.

Stevenson Machinery Co., Bryan, Tex., is planning to rebuild part of plant recently destroyed by fire, with loss over $10,000 including equipment.

Texas Public Service Co., San Angelo, Tex., plans to begin work in May on new pipe lines from Big Lake oilfield in Reagan County to San Angelo and vicinity, with branch line to Rio Pecos, Tex., for service to a power plant at that place, to cost over $1,000,000.

Constantin Refining Co., Tulsa, Okla., Gene Constantin, 1330 Terrace Drive, president, is considering construction of a new refinery and oil-skimming plant at Tyler, Tex., to cost over $200,000 with equipment.

Indiana

BIDS will be asked before close of month by Board of Trustees, Purdue University, Lafayette, for an addition to power plant, to cost close to $100,000 with equipment. Walter Scholer, Wallace Building, is architect; machinery purchases will be made through last-noted office.

Board of Education, Evansville, is asking bids until March 23, for manual training and other equipment for public schools. R. A. Putnam, Public Schools office, Seventh and Vine Streets, is business manager.

Chicago District Electric Generating Corpn., 72 West Adams Street, Chicago, affiliated with Commonwealth Edison Co., same address, with steam-operated electric generating station at Hammond, Ind., is disposing of a preferred stock issue to total $2,910,000, part of proceeds to be used for expansion at power plant. Company has recently awarded general building contract to Herlihy-Mid-Continent Co., 228 North La Salle Street, Chicago, for addition, 210 x 380 ft., and 100 ft. high, and will equip for two more generating units, totaling 132,000 kw., and 125,000 kw., respectively. First-noted is scheduled for completion in 1932, and other unit in year following. Entire program will cost over $20,000,000. Graham, Anderson, Probst & White, 80 East Jackson Boulevard, Chicago, are architects.

National Brake Service, Inc., South Bend, recently organized by W. E. Hoffman and William Powers, South Bend, and associates, plans operation of local service and repair works for automobile brakes and other automotive equipment.

National Guard, Indianapolis, has secured a State appropriation of $15,000 for a new hangar with repair facilities at local Stout airfield, and plans will be drawn soon.

Acme-Evans Co., 852 West Washington Street, Indianapolis, operating flour mills, has taken bids on general contract for a new grain storage and distributing building, 50 x 80 ft., and 120 ft. high, with elevating, conveying and other equipment, to cost about $75,000. Bacon & Tishaw, Architects and Builders Building, are architects.

American Propeller Co., Baltimore, manufacturer of Paragon airplane propeller type fans, and ventilating equipment, is moving its entire plant to new factory at South Bend, Ind. This company, formerly Paragon Engineers, is now a division of Bendix Aviation Corpn.

Pacific Coast

PLANS are being prepared by Ord Copper Co., Daggett, Cal., for a new milling and concentrating plant about 11 miles from Daggett, including power house, machine shop and other structures, to cost over $2,000,000 with machinery. Company is also considering erection of a mineral conversion and reduction plant at same location to cost more than $750,000 with machinery. Victor Smith is general manager.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, has awarded general contract to J. B. Petersen, 4021 Agua Vista Avenue, Oakland, Cal., for one-story equipment storage, distributing and service plant at Santa Rosa, Cal., to cost about $45,000 with equipment.

Board of Education, Chamber of Commerce Building, Los Angeles, has authorized installation of manual training equipment in addition to Grant school to cost about $75,000, for which plans are being drawn by architectural division of board. A. S. Nibecker, Jr., chief architect.

South California Edison Co., Los Angeles, has applied for permission to use fund of $1,500,000 for immediate work in connection with addition to steam-operated electric generating plant at Long Beach, Cal. Entire development will cost about $7,000,000 with machinery. Stone & Webster Engineering Corpn., Laughlin Building, is engineer and contractor. Edison company has plans for a new transmission line from Saugus to Moorpark, Cal., about 25 miles.

Pacific Coast Silica Corpn., Pleasanton, Cal., care of S. D. Miller, Pleasanton, vice-president, recently organized, has secured property at Byron, Cal., and plans erection of new silica sand mining and refining plant, to cost over $100,000 with equipment. Company is also considering new mill for production of sulphuric acid at same location, initial unit to cost over $60,000 with machinery.

Columbia River Power Co., Seattle, has applied for permission to construct a hydroelectric generating plant on Columbia River, near Stevenson, Wash., and Cascade Locks, Ore., to cost close to $20,000,000 with steel tower transmission lines, power substation and other structures. Columbia company was organized recently and is represented by L. E. Donley, Aberdeen, Wash.

City Council, Spokane, Wash., is considering expansion at municipal airport, including new hangar units, repair shop and other field structures, to cost $100,000 with equipment. Department of Public Utilities, Andrew J. Fabian, commissioner, will be in charge of project.

Santa Barbara Union High School District, Santa Barbara, Cal., plans erection of a one-story vocational shop in connection with new two-story school group to cost $80,000, for which bids are being asked on general contract until March 23. W. H. Weeks, 111 Sutter Street, San Francisco, is architect.

Halford Erickson, vice-president in charge of operation, Bylesby Engineering & Management Corpn., Chicago, announces that work will soon be started by California Oregon Power Co. on construction of a regulating dam at Keno, Ore., on Klamath River, to cost about $100,000.

Standard Spring & Manufacturing Co., Ltd., San Francisco, associated with Western Pipe & Steel Co., has completed a new plant for manufacture of coil and elliptic springs for railroad, street railway and industrial uses. Production will be supervised by Fred A. Meckert, vice-president, former general manager of Fort Pitt Spring & Mfg. Co., Pittsburgh.

Foreign

PLANS are under way by Compania Chilena de Electricidad, Santiago, Chile, operated by American & Foreign Power Co., Inc., an interest of Electric Bond & Share Co., 2 Rector Street, New York, for expansion and improvements to cost close to $4,500,000, including new steam-operated electric generating plant in Valparaiso, transmission lines, power substations, etc., at that place, Santiago and vicinity. Engineering department of parent organization is in charge. American & Foreign Power Co., Inc., has acquired a controlling interest in United Eastern Agencies, Ltd., Bombay, India, operating Poona Electric Supply Co. and Karachi Electric Supply Co., Ltd. Purchasing company will operate in conjunction with Tata Hydro-Electric Agencies, Ltd., with hydroelectric power plants and system in Bombay district, and plans extensions and improvements, including power station and transmission lines.

Bids will be asked about July 1 by General Purchasing Officer, Panama Canal, Washington, for a hydroelectric generating plant and power dam on Chagres River, Canal Zone, consisting of dam 220 ft. high and 1200 ft. long, with generating station. Advance information is now available at office noted.

Ford Motor Co. of England, Ltd., London, England, is arranging increase in capital from £7,000,000 to £9,000,000 ($34,020,000 to $43,710,000), part of proceeds to be used for expansion and improvements, including completion of new plant at Dagenham, now in course of erection.

Air Ministry of French Government, Paris, France, is securing an appropriation of $90,000,000 for expansion and operations during 1931, of which about 76 per cent will be used for military aviation, 14 per cent for commercial air service, and

10 per cent for technical development, including aircraft, hangars, repair shops and other field equipment.

Shropshire, Worcestershire & Staffordshire Electric Power Co., London, England, an interest of Utilities Power & Light Corpn., 327 South LaSalle Street, Chicago, has acquired control of South Wales Electrical Power Distribution Co., with properties in vicinity of purchasing company near Birmingham, England. Acquiring company plans expansion, including transmission lines.

Canada

PUBLIC UTILITIES COMMISSION, Utilities Building, London, Ont., E. V. Buchanan, general manager, is asking for prices on two electrically driven waterworks pumps with daily capacity of 2,000,000 gal. each.

F. C. Asquith, acting commissioner of works, Ottawa, Ont., will call for bids soon for new waterworks and filtration plants to cost $1,315,000. Equipment will include three units of 17,000 gal. each and 400-hp. Diesel engine. Gore, Nasmith & Storrie, Confederation Life Building, Toronto, are engineers.

Parkhill Gold Mines, Ltd., care of Canadian Enterprises, Ltd., 1440 St. Catharine Street West, Montreal, will erect a mill at its property in the Michipicoten district of Ontario and purchase equipment. Cost is estimated at $75,000.

Gatehouse Brothers, 86 Adelaide Street East, Toronto, have been awarded contract for first unit of plant at Leaside, Ont., for Tremco Mfg. Co. (Canada), Ltd., Cleveland. W. H. Reid, 81 Victoria Street, is Toronto representative.

Morrison Ice Co., Brockville, Ont., contemplates installation of 10 ton capacity ice making machine. Douglas Morrison, 342 King Street West, is manager.

White Bear Mine, Ltd., 132 St. James Street, Montreal, will spend $75,000 on equipment and buildings for mine at Temagami, Ont. Work will be started within a year.

Competition for Artistic Highway Bridge Design

Students of engineering and architecture in colleges of the United States and Canada are participating in a competition for aesthetic design of a highway bridge, sponsored by the American Institute of Steel Construction, 200 Madison Avenue, New York. Preliminary judging will be April 2, by a jury including Ralph Modjeski and Shortridge Hardesty, consulting engineers, H. H. Murdock and Clinton Mackenzie, architects, and F. E. Schmitt, editor, *Engineering News-Record*.

At the preliminary judging, the 10 best designs by engineering students and the 10 best by architectural students will be selected, and they will be asked to make a finished rendering of their designs for final judgment on May 1. First, second and third prizes are $500, $250 and $100 respectively. Designs in the competition may be submitted to the institute until April.

Studying Technological Unemployment

Technological unemployment studies are under way at Purdue University under the auspices of the American Engineering Council. This unemployment inquiry, dealing with the displacement of workers by machines, aims to measure the influence of science and invention on the business cycle, and to point the way to economic adjustments conforming to the conditions created by the "machine age."

How far machinery is responsible for swelling the ranks of the idle is a problem which must be solved by a disclosure of facts, engineers say. Up to now there has been much theorizing in this field, but authoritative information, to promote the general attack on the causes of recurrent cycles of depression, is lacking.

The Purdue investigation is one of a series of activities planned by the engineering council to meet "the pressing necessity for an attempt to place in balance those forces which, on the one hand, lead to excessive business activity, and, on the other, to sharp business recession."

Railroads Haul Less Freight Than Year Ago

Freight traffic handled by Class I railroads in January amounted to 30,313,736,000 net ton-miles, according to the Bureau of Railway Economics. Compared with January, 1930, this was a reduction of 6,404,026,000 net ton-miles, or 17.4 per cent. It was a reduction of 8,895,900,000 net ton-miles, or 22.7 per cent, from January, 1929.

Great Lakes Plant Starts New 14-in. Bar Mill

The National Steel Corpn. started to roll steel on its new 14-in. merchant mill at its Great Lakes plant at Detroit on March 13. This mill, which has a production capacity of 15,000 tons a month, marks the completion of the $25,000,000 construction program of the company in the Detroit district except for a 10-in. merchant mill, which is scheduled to be put in operation about July 1.

The Great Lakes plant has an annual capacity of 650,000 tons of ingots. Its finishing capacity will be 890,000 tons upon completion of the 10-in. merchant mill, including the 240,000 tons capacity of Michigan Steel Co. recently acquired by National Steel Corpn. to increase its production of finished steel for the Detroit market.

Gifford-Wood Co. Buys C. W. Hunt Co.

The Gifford-Wood Co., Hudson, N. Y., century-old manufacturer of elevating and conveying equipment for coal and ice industries, announces its absorption of the C. W. Hunt Co., Inc., West New Brighton, Staten Island, N. Y. The Gifford-Wood Co. will manufacture and sell the complete line of equipment formerly produced by the C. W. Hunt Co., Inc., and will operate that company as a division of the Gifford-Wood Co.

The C. W. Hunt Co. is one of the oldest manufacturers of material-handling equipment for industrial power plants. Its line consists of pivoted bucket carriers, crushers, belt and flight conveyors for coal as well as a general line of elevators and conveyors for handling bulk material. Locomotive coaling station equipment and narrow gage industrial railway systems are also manufactured.

Sales and service will be handled through the Gifford-Wood sales organization at the Graybar Building, New York, and at 565 West Washington Street, Chicago.

Bureau of Standards Has Thirtieth Anniversary

WASHINGTON, March 13.—The thirtieth anniversary of the establishment of the Bureau of Standards was celebrated last Saturday night when the portrait of its first director, Dr. S. W. Stratton, was presented to the present director, Dr. George K. Burgess, by Henry A. Wise Wood. Secretary of Commerce R. P. Lamont and Mrs. Lamont, Assistant Secretary of Commerce Julius Klein and Mrs. Klein, Assistant Secretary for Aeronautics Clarence M. Young, Dr. Stratton, Miss Margaret Fitzhugh Browne, the artist, were guests at the celebration, together with the staff of the bureau.

103 Locomotives Ordered in February, a Gain

WASHINGTON, March 17.—Orders for railroad locomotives in February represented 103 units against 91 in January, while shipments were 15 compared with 16. The February orders consisted of 96 steam and seven electric locomotives, all of the latter for domestic account. Of the steam locomotives ordered, 85 were for domestic and 11 for foreign shipment.

Members of the Electric Hoist Manufacturers' Association report that the number of hoists ordered during February decreased 38.8 per cent, compared with the previous month, and the value of such orders decreased 16.2 per cent. Shipments were 16.2 per cent smaller in February than they were in January.

Soviet Expands Purchase of Materials in Germany, Britain and Czechoslovakia

Germany plans to sell Soviet 900,000,000 m. ($214,200,000) worth of materials this year for Five-Year Plan.

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British mines protest that quota plan is leading to coal shortage and artificially high prices.

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Cologne, Germany, plant of Ford Motor Co. to start operation April 19, with 2000 employees.

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French steel mills jointly open selling office in China, following German overtures for Far Eastern trade.

(By Cable)

LONDON, ENGLAND, March 16.

WHEN the German industrialists return from their visit to Russia, it is expected to lead to increased German exports to the Soviet Union. A plan has been evolved for short term delivery of goods valued at more than 300,000,000 m. ($71,400,000), bringing the total possible German exports to the Soviet this year to 900,000,000 m. ($214,200,000).

Materials which Germany will ship include machinery, boilers, tubes, rolls, electrical machinery and equipment necessary to development of the Five-Year Plan.

The Soviet Union has decided to increase its agreement to purchase British machine tools from the original £600,000 ($2,916,000) to £1,000,000 ($4,860,000), with provision for further extension.

About 40,000 tons of bars and plates have been placed by the U. S. S. R. with the Vitkovice Works, Czechoslovakia, with option for a further 80,000 tons on credits of 18 months, and in return the selling works will take 350,000 tons of Krivoirog iron ore.

Operation of British mines under the Coal Mines Act is provoking strong protests, it being stated that coal supplies are insufficient and prices advancing artificially. Certain iron and steel companies owning collieries have been forced to purchase outside fuel, because prohibited under the quota plan from producing enough from their own mines for their requirements.

Dorman, Long & Co. have blown out the Redcar basic furnace, and further curtailment in hematite pig iron output appears possible. The Metropolitan Cammell Carriage & Wagon Finance Co. has closed its Nottingham plant and will centralize operations at Birmingham.

General pig iron business here is very dull. Cleveland furnaces are willing to reduce export prices, but buyers are apathetic with hematite prices weaker, following merchant sales at low figures.

Heavy steel products are decidedly inactive. Canada has placed a few lots of steel plates with British mills, but other export business is difficult to close. Domestic steel trade is moderately active in structural engineering, but shipbuilding continues quiet, and mills are operating irregularly.

Continental steel prices have further weakened in the absence of demand, and the eagerness of mills to obtain tonnage to continue operation. Business is quiet in semi-finished material, users not yet needing to replenish their stocks.

The Continental Steel Cartel has reaffirmed its authorized quota of output for second quarter. No agreement for reorganization and renewal of the cartel has been reached, but it has already been temporarily extended to June 30, and a preliminary renewal committee has been instructed to meet soon. The International Rail Makers' Association is maintaining prices.

The Domnarvet works in Sweden is constructing a new electric furnace of 25 tons daily capacity, increasing its annual steel capacity to 125,000 tons.

February iron and steel imports of the United Kingdom were 45,000 tons

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at $4.8665 (par)

British Prices, f.o.b. United Kingdom Ports

Ferromanganese, export	£9	0s.	to	£11	5s.	$43.74	to	$54.75
Billets, open-hearth	5	5	to	5	10	25.52	to	26.76
Black sheets, Japanese specifications	11	10				55.95		
Tin plate, per base box	0	15½	to	0	16	3.77	to	3.89
						Cents a Lb.		
Steel bars, open-hearth	7	15	to	8	5	1.69	to	1.79
Beams, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Channels, open-hearth	7	12½	to	8	12½	1.66	to	1.87
Angles, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Black sheets, No. 24 gage	8	10				1.84		
Galvanized sheets, No. 24 gage	11	0				2.42		

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2	9s.	to	£2	10s.	$11.90	to	$12.15
Billets, Thomas (nominal)	£3	5s.	to	£3	7s.	$15.80	to	$16.28
Wire rods, low C., No. 5 B.W.G.	5	2½	to	5	7½	24.94	to	26.15
Rails, light	6	0				29.20		
Black sheets, No. 31 gage, Japanese	11	5	to	12	12	54.68	to	58.72
						Cents a Lb.		
Steel bars, merchant	3	13	to	3	16	0.81	to	0.82
Beams, Thomas, British standard (nominal)	3	16	to	3	11	0.78	to	0.79
Channels, Thomas, American sections	5	12	to	5	14	1.24	to	1.26
Angles, Thomas, 4-in. and larger, over ⅜-in. thick	3	15	to	3	16	0.81	to	0.82
Angles, Thomas, 3-in.	3	17	to	3	18	0.83	to	0.84
Hoop and strip steel over 6-in. base	4	7½				0.94		
Wire, plain, No. 8 gage	5	0				1.10		
Wire, barbed, 4-pt. No. 12 B.W.G.	9	0				1.91		
Wire nails, base	5	2½				$1.13 a keg		

below the January total. February exports of pig iron were 133,000 tons, of which the United States received 500 tons. Total iron and steel exports were 143,500 tons.

Welsh tin plate makers expect improved demand following the restriction on tin production, but consumers are not yet attracted to place heavy orders. Some inquiry is in the market, chiefly from the Continent, but a much larger tonnage of new business is needed.

Only about 50 per cent of the tin plate mills are now operating, but output is at a higher ratio than this indicates, as the make per shift is maintained at a substantial level. Galvanized and black sheets continue quiet. United Kingdom February exports of galvanized sheets totaled 18,000 tons.

German production of pig iron in February was 520,000 tons, with 53 furnaces in blast at the end of the month.

French production of pig iron in January was 803,000 tons, with 135 furnaces in blast at the end of the month. French raw steel output was 756,000 tons. Rolled steel output in January included 66,000 tons of rails, 63,000 tons of shapes, 32,000 tons of wire rods, 15,000 tons of drawn wire, 14,000 tons of special bars, 192,000 tons of merchant bars, 8000 tons of tin plate, and 84,000 tons of sheets.

Japanese Sheet Piling to Be Tested

YOKOHAMA, JAPAN, Feb. 18.—The Seitetsu Jo (Government Works) has applied to the civil engineering laboratory of the Home Department to test its sheet piles, and the first tests will be made about the end of March. These tests will be comparative, foreign-made sheet piles being tested under the same conditions.

Ford Plant in Cologne to Operate in April

COLOGNE, GERMANY, March 2.—The plant of the Ford Motor Co. here will begin operation April 19, with about 2000 employees. In 1930, the Ford company increased its business in Germany to 46,900,000 m. ($11,209,160) from 38,100,000 m. ($9,105,900) in 1929. As a result, the company has declared a 10 per cent dividend. A majority of shares in the German Ford Motor Co. are held by the Germany Dye Stuff Corpn.

Steel Scrap at Low Level in Japan

YOKOHAMA, JAPAN, Feb. 18.—In a recent statement on Japanese consumption of steel scrap, S. Nagano of the Fuji Steel Works said that the total annual requirements of the Japanese steel industry are about 600,000 tons, of which about 200,000 metric tons is obtained from domestic sources and about 100,000 tons imported. In 1930, imports of scrap reached a total of 480,000 metric tons, but with the steel industry operating on a restricted scale, demand for scrap is now small and the price of heavy melting steel has fallen below 20 yen ($9.80) per ton. Consumers of scrap are planning to buy their requirements jointly, in an effort to stabilize the domestic scrap market.

Japan's Galvanized Sheets Compete

HAMBURG, GERMANY, March 4.—Competition of Japanese corrugated galvanized sheets in world markets is being felt by the British sheet mills, which are encountering the Japanese product in India and the Straits Settlements. Japan's business in these markets has about quadrupled in the past two years. Belgian mills are also feeling Japanese competition and recently have been seeking an agreement on world markets with Japanese sheet producers. Representatives of the Japanese Galvanized Sheet Manufacturers Association are expected to visit Brussels soon.

Many New Pipe Plants in Europe

HAMBURG, GERMANY, March 4.—Cast iron pressure pipe foundries are projected for various industrial centers of Central and Southeastern Europe. In additional to two new plants to be constructed in Austria, a new pipe foundry will be constructed at Feistritz, Jugoslavia. It will be known as the Krainische Industriegesellschaft, and will be the first pipe plant in that country. In Rumania, the Resnitza works is also installing a new plant for producing cast iron pipe, and Greece is reported to be planning the establishment of a pipe works in Piræus. The last mentioned plant will probably be for production of steel pipe, as Greece has large hydroelectric power projects in Thrace and the Peloponnesus.

French Steel Mills Seek Far East Trade

HAMBURG, GERMANY, March 4.—With German industrialists visiting the Far East and German interests planning to erect plants in China, it is noteworthy that French iron and steel producers are exhibiting increased interest in Far Eastern business. Certain of the important French mills, including de Wendel, Rombas, Homecourt, and the Luxemburg producer, Societe des Hauts Fourneaux et Acieries de Differdange St. Ingbert-Rumelange (Hadir), have opened a joint sales office in Shanghai with branches in other Chinese cities. The selling office is operating under the name of Société Francais F. Hardvilliers.

Increased Wire Duty Will Bar German Product

HAMBURG, GERMANY, March 4.—Exporters of wire netting, woven wire mesh and nail-making wire to the United States state the proposed increase in the American duty on these products under the flexible provision of the tariff will stop shipments of such products to the United States. They are urging counter action by raising the German duty on wire-making machinery and machine tools to prohibitive levels. German exports of wire to the United States in 1930 were about 27 per cent lower in value and 18 per cent smaller in tonnage than in 1929.

German Black Sheets Compete in Japan

YOKOHAMA, JAPAN, Feb. 18.—German sellers of light-gage black sheets have further reduced their quotations in the Japanese market from £11 8s. ($55.40) a ton to £11 2s. 6d. ($54.07) a ton. A well-known German brand of black sheets being sold in Japan at present is the "Butterfly." Recent reductions in the quotations of German sellers have apparently been to meet competition of the Japanese domestic product. Consequently buyers are waiting for a price announcement by the leading Japanese maker, the Kawasaki Dockyard Co.

Importers Overruled on Steel Tariffs

WASHINGTON, March 17.—The United States Court of Customs and Patent Appeals in three decisions has affirmed the United States Customs Court in overruling protests of importers against duties assessed on steel products. In the case of Cron & Dehn Hardware Corpn. and other importers galvanized wire netting was assessed at 40 per cent as an article of metal. The importers protested it was properly dutiable at 25 per cent as woven wire fabric.

In the case of the Braun-Steeple Co. and others, thin sheets of steel, 6 ft. long and 3 ft. wide, were assessed at 40 per cent as articles of steel. The importers protested that they were properly dutiable at 2½c. a lb. as stamped shapes of steel not specially provided for.

In the case of the Amerlux Steel Corpn., checkered, or raised diamond, steel floor plates, were assessed at 3/10c a lb. as steel plates, not specially provided for. The importer protested that they were properly dutiable at 1/5c. a lb. as building forms or structural shapes.

The Duriron Co., Inc., Dayton, Ohio, has opened a branch office in the Leader Building, Cleveland, in charge of E. D. Brauns.

Steel Corporation Reports on Its 1930 Earnings

TOTAL earnings for last year are reported by the United States Steel Corpn., in its pamphlet just issued to stockholders, at $157,710,232. Deducting interest on bonds and mortgages, charges and allowances for depreciation and obsolescence, etc., and adding special income receipts for the year, including net interest on Federal tax refunds, there was a balance available for dividends and surplus of $104,421,571. This was a reduction from 1929 in this item of $93,170,489, or 47 per cent.

Dividends paid on preferred stock amounted, as for a number of years past, to $25,219,677. Dividends on common stock at the regular 7 per cent rate were $60,365,797, leaving a final surplus of net income of $18,836,097, compared with $108,523,343 in 1929, or almost six times as much.

Undivided surplus showed a balance Dec. 31, 1930, of $471,782,759. This does not include the appropriated surplus of $270,000,000 to cover capital expenditures. Surpluses of subsidiary companies are given as $39,346,047.

Operations Averaged 65.6 Per Cent

For the entire year the production of rolled and other finished products for sale averaged 65.6 per cent of capacity, compared with 89.2 per cent in 1929. There was a marked drop in the last half of the year, such that the last quarter figured out at only 47.9 per cent of capacity. This was, with one exception, the lowest in the history of the Corporation, the low figure having been 47.5 per cent in 1921.

"Continued lessening in demand during the year," the report says, "was accompanied with a substantial decline in prices secured. As a result, the average selling price received for the total tonnage of rolled and other finished products shipped in 1930, compared with the price received in 1929 for an equal tonnage of similar products, respectively, was $3.61 a ton less for domestic and $2.03 a ton less for export shipments. These decreases in prices accounted for a reduction of approximately $40,000,000 of the total reduction of $108,128,700 in the net earnings realized in 1930, compared with those for 1929."

Unfilled orders at the close of the year, as previously reported, amounted to 3,943,596 tons, as compared with 4,417,193 tons at the end of 1929. Unfilled orders showed a gain during the first quarter of the year, reaching a maximum at the end of March of 4,570,653 tons. Then there was a decline, with only one brief interruption, to the year's minimum of 3,424,339 tons at the end of September, followed by a rise of more than 500,000 tons in the last quarter.

Finished Products 11,609,265 Tons

Decreases in output were general in all departments of the corporation's business during the year, as compared with the preceding year. Only one major item showed a reversal of this tendency, this being finished structural work, which went up 10 per cent above the 1929 tonnage. As foreshadowed in the annual report one year earlier, Portland cement stood up exceptionally well during the year, the combined output of the company's plants, including the Atlas Portland Cement Co., acquired at the beginning of the year, having been only 2.2 per cent lower than the 1929 production.

Aggregate production of finished steel products shipped to both domestic and foreign trade amounted to 11,609,265 tons in 1930, compared with 15,302,669 tons in 1929. The reduction was 24.1 per cent, against a gain of about 9 per cent in 1929 over 1928. All of the main forms of steel showed declines, with the sole exception, mentioned above, of finished structural work. The losses varied from a minimum of 13.5 per cent in tubing and pipe to a maximum of 34.2 per cent in axles. This latter followed an increase of 94.2 per cent in the preceding year.

Total value of business transacted

Production and Shipments in 1930 and 1929

Products	1930, Tons	1929 Tons	Decrease Tons	Decrease Per Cent
Ores mined	24,282,767	30,240,567	5,957,800	20.3
Limestone quarried (includes dolomite and fluorspar)	14,611,327	*18,035,982	3,424,655	19.0
Coal mined	25,388,263	31,826,851	6,438,588	20.2
Beehive coke	51,396	987,404	936,011	94.8
By-product coke	13,061,992	16,367,632	3,305,640	20.2
Pig iron	12,578,443	16,295,119	3,716,676	22.8
Spiegel, ferromanganese and ferrosilicon	179,180	189,566	10,376	5.5
Bessemer ingots	2,182,279	3,223,272	1,041,993	32.3
Open-hearth ingots	13,543,193	17,615,543	4,072,350	23.1
Rolled and finished steel products				
Steel rails (heavy and light T and girder)	947,697	1,162,704	215,007	18.5
Blooms, billets, slabs, sheet and tin plate bars	820,306	1,008,477	187,671	18.6
Plates	1,260,685	1,889,793	629,108	33.3
Heavy structural shapes	976,131	1,526,678	550,547	36.1
Merchant bars, hoops, skelp, light shapes, etc.	2,435,549	3,106,628	1,023,879	32.1
Tubing and pipe	1,294,621	1,495,940	201,319	13.5
Wire rods	160,672	229,283	68,611	29.9
Wire and wire products	1,034,247	1,324,262	290,015	21.9
Sheets (black and galvanized) and tin plate	1,556,269	2,091,267	536,998	25.6
Finished structural work	798,793	685,764	(+) 113,029	16.5
Angle splice bars and all other rail joints	182,147	229,867	47,720	20.8
Spikes, bolts, nuts and rivets	146,101	205,423	59,322	28.8
Axles	49,513	75,896	25,983	34.2
Steel car wheels	64,157	94,137	29,981	31.8
Sundry steel and iron products	224,077	262,375	38,298	14.6
Total	11,609,265	15,302,669	3,693,404	24.1
Miscellaneous products				
Zinc	54,532	75,202	20,670	27.5
Sulphate of iron	29,148	40,612	11,464	27.9
Fertilizer—basic slag	26,199	34,334	8,135	23.7
Ammonia (in sulphate equivalent)	220,597	245,697	25,100	10.2
Benzol products	202,758	228,101	25,343	11.2
Universal Portland cement (bbl.)	24,294,154	*24,843,977	549,823	2.2

*Includes production of Atlas Portland Cement Co. acquired Jan. 31, 1930.
(+) Increase.

Comparative Income Account for Fiscal Years Ended Dec. 31, 1930 and 1929

	1930	1929	Decrease
Earnings—Before charging interest on bonds and mortgages of subsidiary companies:			
First quarter	$49,615,397.18	$61,978,984.92	$12,363,587.74
Second quarter	47,061,304.63	73,861,425.16	26,800,120.53
Third quarter	37,995,299.50	72,009,666.20	34,014,366.70
Fourth quarter	23,038,230.41	57,988,855.99	34,950,625.58
Total for year	*$157,710,231.72	*$265,838,932.27	$108,128,700.55
Less, interest on outstanding bonds and mortgages of the subsidiary companies	5,593,367.87	7,116,478.98	1,523,111.61
Balance of earnings	$152,116,864.85	$258,722,453.29	$106,605,588.94
Less, charges and allowances for depletion, depreciation, amortization and obsolescence	58,550,120.14	63,274,162.66	4,724,042.52
Net income in the year	$93,566,744.21	$195,448,290.63	$101,881,546.42
Deduct,			
Interest on United States Steel Corporation bonds outstanding	46,729.05	7,828,291.36	7,781,662.31
Balance	$93,520,015.16	$187,619,999.27	$94,099,884.11
Add: Special income receipts for the year, including adjustments of various accounts	10,901,555.99	9,972,160.97	(a) 929,395.02
	$104,421,571.15	$197,592,060.24	$93,170,489.09
Dividends on United States Steel Corporation stocks:			
Preferred, 7 per cent	25,219,677.00	25,219,677.00	
Common—1929 regular 7 per cent, extra 1 per cent; 1930 regular 7 per cent	60,365,796.75	63,849,040.25	3,483,243.50
Surplus net income	$18,836,097.40	$108,523,342.99	$89,687,245.59

*Balance of earnings after making allowances for estimated amount of Federal income taxes.
(a) Increase.

during the year was $1,180,934,971, compared with $1,509,584,637 in 1929. This represents a decline of more than 21 per cent. It compares with an increase in 1929 of nearly 9 per cent over 1928.

Expenditures for repairs and replacements were $96,147,282, a reduction of 9.6 per cent from the $106,364,769 similarly expended in 1929. In addition, exhaustion of natural resources and deterioration and obsolescence of plants and properties called for appropriations from subsidiary company earnings during the year amounting to $58,721,809, compared with $63,143,861 in 1929.

Bond Reduction $10,479,567

Continuing the program of reducing the fixed indebtedness of the corporation, there was a net reduction during the year of $10,479,567. Of this amount $7,141,500 covers bonds of the corporation and of subsidiary companies presented for redemption in 1930 and paid from funds deposited with trustees in 1929. Through maturity or sinking fund operations subsidiary companies' bonds to the amount of $3,761,000 were retired during the year. With adjustment for real estate mortgages, etc., in connection with acquirement of properties and for cash funds on deposit with trustees to redeem bonds, there remained a total net bonded and mortgage debt at the end of the year of $100,876,611.

Issues of additional common stock were made to the extent of 554,595 shares, of which 18,157 shares went to employees who had subscribed for them and the remainder went toward the purchase of properties, plants, business, etc., of the Atlas Portland Cement Co., Columbia Steel Corpn. and Oil Well Supply Co. Properties received in return for the issue of this stock, including net current and working assets, were valued at $91,570,335. The difference between this amount, and the par value of stock issued against it, amounting to $37,926,535, is carried in the balance sheet in "premiums on capital stock." Total capital stock outstanding at the end of 1930, with a par value of $100 a share under each heading, amounted to 8,687,435 shares of common stock and 3,602,811 shares of preferred stock.

Employees Fewer by 6.19 Per Cent

During 1930 the average number of employees of the corporation and subsidiary companies was 211,053 compared with 224,980 during 1929. The decrease was 6.19 per cent, distributed unevenly over the main groups of properties. Manufacturing properties showed a decrease of 4.87 per cent, iron ore properties, of 2.23 per cent, coal and coke properties, of 17.45 per cent, transportation properties, of 5.93 per cent, and miscellaneous 9.54 per cent.

Total wages and salaries paid amounted to $391,271,366 in 1930, a reduction of 6.86 per cent from the $420,072,851 paid in 1929. Simple division shows that the average employee received in 1930 $1,854, which works out at $5.80 a day, exclusive of the general administration and selling force. This was a reduction of 4c. daily, compared with 1929.

At the close of 1930 the available rated annual capacity of the subsidiary companies included 21,737,000 gross tons of pig iron and ferroalloys, from blast furnaces, an increase during the year of 658,000 tons; 26,075,000 tons of steel ingots and castings, an increase during the year of 912,000 tons; 18,371,000 tons of finished steel products for sale, an increase during the year of 666,500 tons. With the completion during 1931 of extensions and betterments now under way, these figures will be increased to about 28,000,000 tons of ingots and castings and 19,750,000 tons of finished steel products for sale.

Foreign and Domestic Shipments

Domestic Shipments	1930, Tons	1929, Tons	Decrease Tons	Decrease Per Cent
Rolled and finished steel products	10,800,628	14,027,128	3,226,490	23.00
Pig iron, ingots, ferroalloys and scrap	314,525	339,867	25,342	7.46
Coal, coke, iron ore and limestone	4,469,398	6,217,942	1,748,546	28.12
Sundry materials and by-products	276,341	169,557	*106,784	62.98
Total tons all kinds of materials, except cement	15,860,900	20,754,494	4,893,594	23.57
Universal Portland cement (bbls.)	23,084,305	(a) 12,234,733	*10,849,572	88.68

Export Shipments	1930, Tons	1929, Tons	Decrease Tons	Decrease Per Cent
Rolled and finished steel products	823,656	1,207,227	383,571	31.77
Pig iron, ferroalloys and scrap	5,894	20,962	14,968	71.41
Sundry materials and by-products	139,147	188,309	49,162	26.11
Total tons all kinds of materials	968,797	1,416,498	447,701	31.61
Aggregate tonnage of rolled and finished steel products shipped to both domestic and export trade	11,624,294	15,234,355	3,610,061	23.70
Total value of business (covering all of above shipments, including cement, marine equipment delivered and other business not measured by the ton unit):				
Domestic (not including intercompany sales)	$702,188,579	$890,485,381	$187,996,802	21.11
Export	64,934,263	89,956,313	25,022,050	27.91
Total	$767,122,844	$980,441,696	$213,018,852	21.73

*Increase.
(a) Excludes shipments of Atlas Portland Cement Co.

American Rolling Mill Passes Dividend

The American Rolling Mill Co. has omitted payment of common stock dividend for the current quarter. Net income for 1930 amounted to $114,-094 after depreciation, Federal taxes, etc., equal after preferred dividends to 3c. a share on 1,710,805 shares of common stock outstanding at the end of the year. The company earned $4.24 a share in 1929 on 1,428,623 shares of stock outstanding at the end of that year.

In a statement to stockholders, Charles R. Hook, president, said: "Under the very depressed conditions which existed after the middle of last year, the sheet industry was unusually hard hit, more so than other branches of the steel industry. The low production which resulted brought higher costs and extremely low selling prices; these together with year-end adjustments account for the poor showing in net income.

"January business was better than December, February has been better than January, and we look forward with hopeful confidence to a continued gradual but permanent improvement."

Hard, Low-Friction Bronze Bearings

Bushings and bearings made of new super-hard, low-friction bronze alloys are announced by the Bunting Brass & Bronze Co., following extensive research by the Bunting organization.

This new super-hard bronze product is claimed to meet completely the need of mechanical industry for a bearing for applications where hardness and ability to withstand pounding are desired, together with the low friction and minimum wear assured by a leaded phosphor bronze alloy. Such bearing requirements are especially a problem in mechanical applications subjected to shock loads, high speeds and other severe operating conditions.

The lead content in this new bearing can be varied from 5 per cent to 25 per cent, depending on the type of service required.

Smaller Imports of Pig Iron

Pig iron imports into the United States in January are reported by the Department of Commerce at 11,-141 gross tons, a decline of 20 per cent from the December movement. The January total was the smallest for any month since last September.

About three-fourths of the total came from British India, which, in December, furnished almost the whole of the imports. Substantial gains were made in January in receipts from Sweden and from the Netherlands.

Coal Stocks Sufficient for 32 Days' Use

Supplies of bituminous coal in various industries in the United States at the beginning of February are estimated by the National Association of Purchasing Agents to be equivalent to 32 days of consumption at current rates. This varies among the industries, by-product coke plants having enough for 36 days, coal gas plants for 64 days, electric utilities for 47 days, railroads for 24 days, steel mills for 29 days and other industries for 31 days.

Total stocks of anthracite and bituminous coal in industrial hands in the United States and Canada on Feb. 1 are given as 33,551,000 net tons. This is a reduction of almost 2,000,000 tons during January and is the lowest figure since Aug. 1. Compared with one year earlier it represents a drop to 3,527,000 tons, or more than 9 per cent.

Industrial consumption in January is estimated at 31,590,000 tons, a drop of 2 per cent from the December use, but otherwise, with the sole exception of last October, the largest figure since last June.

Bulletins on Cost Accounting

To meet the need of closer scrutiny of business operations, especially during the present period of readjustment, the Department of Manufacture of the Chamber of Commerce of the United States, Washington, is issuing a series of bulletins on cost accounting.

The first of these—"Costs-Markets-Prices: Challenge to Industry"—deals with general aspects of the subject. The second, which has just been released—"Material Costs in Industry"—covers a more specific problem. Others in the series will be issued from time to time. Arrangements may be made with the Department of Manufacture for obtaining the complete series on request.

United States Imports of Pig Iron by Countries of Shipment

(In Gross Tons)

	January, 1931	December, 1930	January, 1930
United Kingdom	38	50	2,158
British India	9,320	12,293	5,584
Germany	77		
Netherlands	685	47	93
Canada		18	
France	23		
Belgium			
Norway	51	51	147
Sweden	1,876	69	76
All others	138		
Total	11,141	12,881	8,060

Micro-motion Is Discussed at Informal Conference

Marked reduction of the unit cost in certain manufacturing processes, accompanied by an increase in workers' earnings, in continuous production shops has been found to result from the adoption of correct working methods discovered by a detailed micro-motion study. Statements to this effect were made by J. A. Piacitelli, consulting engineer, New York, at an informal conference held March 6 under the auspices of the management division of the American Society of Mechanical Engineers, at the Engineering Societies Building, New York.

Motion pictures and a specialized clock, reading to 0.0005 minute, are used in a modern technique of micro-motion study. The clock is placed in the field of the camera while moving pictures are taken of the entire process to be studied. This process may involve either a single operator or a group of workmen engaged in a recurrent task. In subsequent analysis of the film, the exact time of each element of motion is determined merely by noting the position of the clock hands as shown at the beginning and end of the movement.

Study data collected by the camera method follows the principles of motion demonstrated by the Gilbreths, pioneers in the field. It involves dividing a manufacturing process into elements of motion, of which 17 have been distinguished and identified. Each element, or "therblig," as it is termed, is indicated on chart from which the time taken by each element and by the total operation is apparent. Study of this chart enables the analyst to determine unnecessary delays and to recommend improvements in the operator's method of working.

Mr. Piacitelli illustrated his discussion with motion picture films actually used in making a micro-motion study. Another reel showed the same operation after improvements, indicated by the analysis, had been put into practice. The increase in efficiency and the evidence of reduction in fatigue on the part of the workmen was apparent.

Results of micro-motion study, in addition to reduction of unit manufacturing costs by detailed analysis of mass product on work were said to be general improvement in morale and working methods by training all workers in general methods of motion conservation; in short, by making them "motion-conscious." In this connection, it was pointed out in the general discussion, that Russia was one of the first countries in which the value of micro-motion study was realized. It was stated that Russian workers have been trained on dummy machines, on which they learn correct working practices demonstrated to them by motion pictures of highly skilled and efficient operators.

Advances in Chucking Equipment

(*Continued from page 933*)

thread in the disk, and as the key is applied, the collet is withdrawn until it is securely closed. It is not necessary to hold the lathe spindle to prevent turning, when using the wrench.

Other improvements in lathe and milling machine chucks consist in the simplification and perfection of air-operated, lever-operated and magnetic chucks, and the development of electric power-operated chucks.

Drill Chucks Carefully Balanced

The modern drill chuck, made in a wide range of sizes, from a unit weighing a couple of ounces and capable of handling a drill so small that one can barely see it with the naked eye, to a chuck large enough to hold a 1-in. drill or boring bar, furnishes a good example of the progress made by chuck manufacturers during the period under consideration. For modern drilling, where drill speeds range up to 20,000 r.p.m., balance is essential. These chucks are built to maintain micrometer accuracy despite repeated tightening with a wrench. This improvement has been brought about by the use of better materials, exacting heat treatments, and design that permits increased gripping power. With such chucks, every time the index of a high-powered automatic clicks, the drills are fed in with surety, which forestalls the breaking of tools, the damaging of fixtures, and the spoiling of work.

In the illustration herewith, an outside and phantom view of a modern chuck is shown, while at the right is the drill chuck of ten years ago. Wear that ruined the soft body of the old-type chuck does not affect the new type, for the hardened body is proof against battering. Hence there will be no wear of the pinion hole and proper mesh of the gear teeth will be maintained. Then, by the addition of ball bearings, friction in the new-type chuck has been virtually eliminated. So little force is required to tighten a ball-bearing chuck that this may be done by hand or by slight pressure applied to the bevel-gear key. This improvement has permitted the use of coarse threads having twice the pitch of the older chuck jaws, which provides greater strength and twice the speed of travel. Twice the gripping power is secured with the coarse threads and the ball bearings, owing to the elimination of friction due to the thrust of the nut against the chuck body. The increased gripping power thus obtained serves also to prevent the cutting and gouging of the drill shanks, which action is accompanied by the wearing away of the chuck jaws. This wearing away of the chuck jaws is greatly lessened also by the use of special alloy steels so heat treated that while file hard they can withstand an enormous bending force without breaking. Thus, the fine, uniform, ground land of the jaws is maintained in use, and the accuracy of the chuck is preserved.

Often it is asked, why replace a chuck that does not appear to be very much worn? From the standpoint of economy there may be one or more of a dozen different reasons for doing so. Perhaps the jaws have become so worn that they fit loosely; if so, they will have a tendency to heel or bell-mouth, and then they cannot properly hold a piece of work, or keep it in a true position. It may be that the chuck selected was so small or so light as to limit the capacity of the lathe. Very often from overstraining, lack of lubrication, or just ordinary wear, a chuck can get into such condition that excessive time is required to chuck the work. Everyone with shop experience knows that such chucks are not uncommon. Actually, the use of them costs too much, and especially so if on production work. At times the wrong chuck is used because the right one wasn't available when it was needed. With a combination chuck some jobs could be handled in half the time needed if a different kind of chuck were used. Also, work is being turned on independent and old-style combination chucks when with a good universal chuck several times as much could be done.

Research—the Only Defense

(*Concluded from page 925*)

comes from the development of products and processes that fill completely new needs. It is without doubt in this field that the greatest successes of the future will occur, and inter-commodity competition may be less serious if research programs lay more emphasis on it.

On the whole, an economic analysis leads us to the conclusion that inter-commodity competition is with us to stay, and indeed that it is likely to become more, rather than less, important with the passage of time. The manufacturer's only defense is a well-conducted scientific research program, in turn guided by economic research and market studies, in a continual effort to develop new uses for old products and to find new products that open up completely new fields.

Profitable Depression Policies

(*Concluded from page 923*)

railroads have for years made it their policy to put through further extensions and the creation of new facilities during periods of low activity.

The fact that this policy has proved advantageous and financially remunerative to some of the larger, well managed businesses, representing a wide range of diversification in industry, does not mean that this policy is peculiar to the larger industrial units, but it does mean that they have carefully worked out a policy and program which they are prepared to put into effect at the proper point in the business cycle.

It does not mean that smaller units are necessarily barred from appropriating the same principles with corresponding results, but it does mean that a policy should be determined and that a carefully worked out and coordinated program should be developed and be available with the necessary financial requirements to consummate the program.

Open-Hearth Steel Process as a Problem in Chemical Kinetics

(*Concluded from page 929*)

from slag to metal can be reduced by decreasing the FeO content of the slag, or by lowering the distribution constant $r = \frac{[FeO]_M}{[FeO]_s}$. The latter may be attained by increasing the SiO_2 content; *e. g.*, the acid open-hearth process.

4. The theoretical considerations leading finally to equation 27 also have a value in outlining research. Although it is probably impossible to secure a complete equation for the problem, and impracticable to use such an equation even if it and all of its contents could be found, considerable progress can still be made by an intelligent grouping of several of the terms and variables. In some plants where steel of a comparatively restricted range of composition and properties is made almost exclusively, or for a single furnace which is used for only one kind of steel, it is not impossible that a simple empirical equation containing temperature as one of the variables can be obtained from a careful study of the operations over a period of time. Such an equation, of course, would possess little, if any, theoretical significance. In melting certain special steels, certain terms in the equation become more important than others. For a high-manganese steel scrap, the term $\left(\frac{d[FeO]_M}{dt}\right)_{M_n}$ would be of the same importance as the rate of carbon elimination.

Discussion on Open-Hearth Kinetics

NEED for research into the elimination of metalloids in open-hearth processes, and also into the rate of diffusion of metalloids through the steel and the slag, was stressed by Leo F. Reinartz, works manager, American Rolling Mill Co., Middletown, Ohio. He suggested that the slowing up of the rate of carbon elimination near the end of the heat may be due in part to a reversal of reaction, whereby carbon goes back in some measure into the steel itself. Stirring of the bath tends to break up what might otherwise be a super-saturated solution and thus permits the elimination to proceed.

Mr. Reinartz believes that the open-hearth reactions in themselves are of so complicated a nature that it is exceedingly difficult to explain them by the use of mathematical equations. There are so many chemical and mechanical conditions present as to defy the usual mathematical analysis.

Mechanical Factors Involved

He spoke of the use of fluorspar in speeding up the furnace reaction near the end as one of these disturbing features. Furnace design and the character of the fuel used will have their influence, and these cannot well be evaluated mathematically. The silicon content again affects the rate of carbon elimination.

A German investigator has recently shown how very rapid—almost instantaneous, in fact—is the diffusion of manganese or silicon in the shallow, open-hearth bath characteristic of German practice. It is customary in the United States to use much deeper baths, resulting in a slower rate of diffusion.

Solubility of C O in iron was stressed by Dr. Reginald S. Dean, United States Bureau of Mines, Washington, who points out that these questions of solubility in the open-hearth process must relate largely to two substances of approximately equal pressure. However, investigators discussing this problem almost always start with the assumption of a finite, or definite, solubility of C O and this, the speaker said, contravenes all our present knowledge of solubility.

C O is formed in large measure at the interface between metal and slag, largely in the form of bubbles, and also largely not in solution at all.

A difficulty in attempting to use mathematics in trying to show the open-hearth reactions was pointed out by Dr. Haakon Styri, of S.K.F. Laboratories, Philadelphia. He stated that some of the equations developed in the case are practically impossible, unless there is no slag whatever. Answering this point, Alexander L. Feild, Union Carbide Laboratories, stated that the solubility of C O is not in question. The term containing C O is an additive term, and purely subsidiary with regard to the main point.

Importance of Diffusion

Dr. C. H. Herty, Jr., United States Bureau of Mines, pointed out that we have all assumed in these investigations that the pressure of C O is a constant, but its solubility has not been assumed as zero. In this speaker's opinion the diffusion factors brought out in the case are much more important than those relating to reactions. Particularly is this true in the practical aspects of killed steel. It is possible to deoxidize this steel easily, but the inclusions must not be permitted to get into the steel too rapidly.

Another speaker, who thought that the mathematical formulas are not practically usable by steel makers, found them decidedly useful, nevertheless, in providing a better understanding of the meaning and the occurrence of open-hearth reactions.

Reactions May Partly Neutralize Each Other

In closing the discussion, Professor Jette said that it has been assumed all along that the backward reaction in the relation of the elements to each other is negligible. In any case, such equations as have been used gave the net reaction, after deducting the backward effect from that in the forward direction.

In particular, he points out that his equation, attacked as being impossible unless it be assumed that there is no slag, was distinctly limited to a closed system, carefully defined. It was not intended as a general equation applicable for use in analyzing ordinary open-hearth process work. He stated that the kinetic rate may be measured by the equation

$$FeO + C \rightarrow Fe + CO$$

in which the measurement may be either FeO or C because each molecule of FeO going out of the solution is accompanied by a corresponding molecule of C, and hence either one may be regarded as an adequate measure.

Business as Others See It

Digest of Current Financial and Economic Opinion

AN authentic ring is Brookmire's characterization of the current gains in business—notably in steel and automobiles. That organization says the "decline is over—moderate improvement expected." But the warning is sounded that the coming rise will be of minor proportions and short duration when compared with previous periods of prosperity. Brookmire's "adjusted index" shows a rise for February—six of its eight components participating. Only car loadings and building lag.

Progress toward good business conditions is everywhere found "exasperatingly slow," as Alexander Hamilton Institute puts it. But the institute finds employment improving, and retail trade in February was slightly higher than in January. Most important—"commodity prices have begun to show a firmer tendency." Stocks of steel and iron, drugs and chemicals are found not well liquidated.

Three Cities Out of Four Report Gains

Surveying conditions in 199 cities, scattered all over the United States, this institute finds that 74.9 per cent report an upward trend in business, compared with only 61.3 per cent so reporting a month earlier. Even so—only 2 per cent call conditions good (1 per cent did so last month) and 1 per cent say "fair."

Residential building, one of the chief mainstays in climbing out of the 1921 depression and conspicuously absent as such this year, is reported by Dodge to have made "a turn for the better." The February figures are up—the "first reversal since 1928"—being about one-third of total contract awards in the 37 States surveyed.

Encouraging developments in the bond market have been offset, in the opinion of *Financial Chronicle*, by the cut in New York Central dividend rate, to which "additional significance attaches . . . as it came after similar reductions by other railroads." But the action was regarded as inevitable, for in 1930 "the railroads of the United States netted a return of only 3.36 per cent on their property investment."

That paper renews its attacks on inflated wage scales—in certain quarters, railroads included—as "obstructing the normal, the inevitable, course of rectification." But a cheerful note is struck regarding the adjournment of Congress, under the caption "The Blessed Interlude."

Climbing Out of the Slough

Genuine recovery may be already under way, although for the most part invisible, thinks Benjamin Baker, in *Annalist*. There have been "two particularly unsatisfactory features, however, in the unseasonally small volume of freight loadings and the abnormally small new orders of the Steel Corporation."

Increases in activity, for the first time in many months, outnumber declines, in the analysis made by La Salle Extension University. "We can be confident that the prospects ahead are for continued recovery and gradually increasing activity." And McGill Commodity Service says: "The most important general price advance in nine years will be under way within a few months."

Legislative Free-Handedness Scored

That "financial exhaustion is the only way of checking the present [Congressional] extravagance" is, *Commerce and Finance* says, the assertion of many American business men. . . . "The probability of tax increases is viewed with apprehension by many."

To offset this, Mr. Price views the news from abroad as encouraging. To whatever extent we shall have to depend upon foreign markets for our own recuperation, "the adherence of Italy [and France] to the Five-Power Naval Pact [which has already stimulated business in Europe], the settlement of the East India question . . ., and the progress made toward tranquility in China" will all be helpful. "As a result the British textile industry is improved, and the feeling in Manchester . . . has become more optimistic than it has been for years."

900-Ton Press, Rack Driven from Electric Motor

(Concluded from page 945)

of the whole machine in continuous action.

From the production point of view, the capacity of the machine is one ball into an ingot for the blooming mill every 2 min., or approximately 1800 tons a day. While still at a desirable rolling temperature, the ingot, after leaving the press, reaches the blooming mill, where the big three-high trains of breaking-down rolls rough it down to appropriate sizes. On the same heat, additional rolling in a 24-in. three-high mill produces the shipping product, either billets suitable for direct rolling into skelp, or standard muck-bar sections used for piling.

Some of the features of production of the iron balls upon which this press acts, not brought out in our article on the process published last October, may be summarized briefly in the following paragraphs:

Quick action between the processing of the metal, by pouring it through the molten slag, and the pressing of the ball into ingot form in the press described above is made possible through the rapid solidification of the mass into the sponge form in which it reaches the press. This quick solidification again is furthered by the fact that the slag temperature, being several hundred degrees below the melting point of the iron going through the slag, causes the iron to chill as it passes through in a finely divided state, and thus tends to form quickly the large, plastic lump at the bottom of the ladle.

This difference in temperature between the slag and the freezing point of the refined metal is from 300 to 400 deg. Fahr. Pouring of the 3-ton mass of metal into the ladle takes about 3 min., the rate being controlled automatically. It is practically solid as it gathers into its ball form in the bottom of the ladle, and hence is ready very quickly to go into the press.

One chemical problem has to do with getting rid of sulphur, a certain amount of which is picked up from the coke during the melting in the cupola. This, of course, cannot be removed by the Bessemer process of blowing. Hence, each ladle of cupola metal while being tapped is treated with 20 to 25 lb. of fused soda ash, to reduce the sulphur to a satisfactory limit. The slag resulting from this soda ash addition is skimmed off before the metal reaches the Bessemer converter.

THE IRON AGE

March 26, 1931

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$100 WORTH OF TECHNICAL BOOKS, AND MORE, FOR $6

EXCLUDING the Annual Review Number of Jan. 1, the 12 issues of The Iron Age published so far this year contain 944 editorial pages. About one-half this space is devoted to information on production methods, plant management, metallurgy, and kindred subjects of a technical nature.

The facts about the new method or product are laid before you while still new. Later on these facts find their way into technical books. The average technical book contains about 60,000 words. The Iron Age page approximates 1000 words. Therefore, in the course of a year you obtain from The Iron Age the equivalent of 30 technical books. As three dollars is a modest price to pay for a technical book, the entire lot would probably cost well over a hundred dollars.

But that represents only half the information you get from The Iron Age. In addition, there are the reports of business conditions, market reports, price quotations, news of what is happening to men, businesses and industries, plus those other features that make The Iron Age, as a subscriber writes, "the first word as well as the last word in its field."

—A. H. D.

76th IRON AGE YEAR

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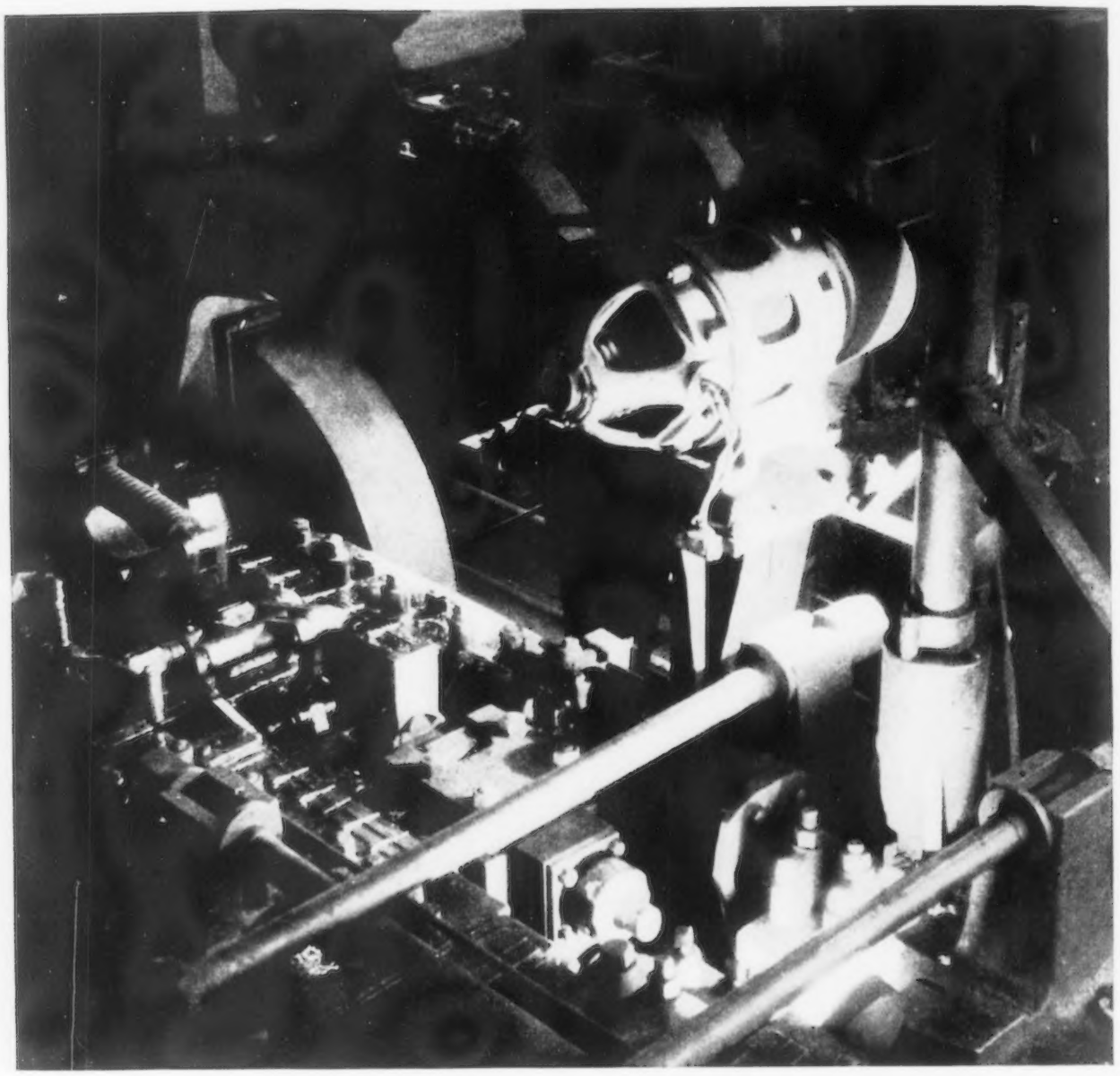

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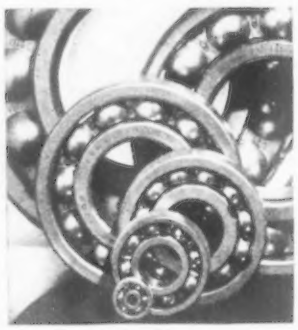


Once a year is often enough to lubricate electric motors when they are equipped with New Departure Ball Bearings. The money thus saved for lubricant and time for applying it is no small item. New Departure-equipped motors are clean, and trim looking; they operate equally well on end, on walls, on ceilings. So near-to-nothing is the friction in New Departures that wear is almost unheard of . . . this discourages burn-outs from maladjusted armatures. Industry is putting New Departures to work in countless thousands of motors. These days, more than ever, your profits depend on what you save in production and maintenance costs. Are you saving as much as you should on your motors? The New Departure Mfg. Co., Bristol, Conn.

1701

NEW DEPARTURE BALL BEARINGS

This Issue In Brief

MARCH 26, 1931

NEXT WEEK

UNEMPLOYMENT is a "big propolition." But it will be solved by the Amoses and not by the Andys. American business leadership fears the dole system or any other plan that threatens to impose a cumulative burden on society. That such apprehensions are justified will become apparent by reading an analysis in our next issue of the economic difficulties arising from State unemployment benefits abroad. American managerial genius will find a better remedy for industrial idleness. It led the way in raising production and earnings per worker. It may well lead the van in stabilizing employment.

Wanted: Not a Shorter Work Day but Better Industrial Thinking

Production begets consumption. A shorter work day decreases consumption. What is needed is the development of more new activities to engage our energies and satisfy our wants.—Page 993

* * *

Period of Any Industry's Rapid Growth Is Short

In no industry has it lasted for any considerable number of years. Over-expansion is due in considerable measure to failure to recognize this fact.—Page 994

* * *

Inspection Costs Cut by Use of Special Gages

Moving picture equipment parts are made to close tolerances, requiring considerable inspection. Gages are made in duplicate; one is located at the producing machine. The inspector has the other.—Page 1000

* * *

Thicker Steels for Higher Pressures

As steam pressures go up, thicker walled boilers, pipe lines and valves can be provided. But the problem of elevated temperatures is not so easily solved. A steel with a tensile strength of 70,000 lb. per sq. in. at room temperature is only half as strong at 1000 deg. F., a temperature that steam plant designers plan to employ.—Page 1004

* * *

"Electric Eye" Is an Economical and Unfailing Control Valve

In many cases it eliminates entire series of operations, reducing production costs and increasing operating efficiency. Industry is just beginning to realize what a great number of jobs the photoelectric tube can do well.—Page 1012

* * *

Are Designers Unfair to Castings?

"Many parts rightfully belonging to the foundry are today made in forgings and pressed and fabricated steel only because the designer was willing to reduce his design . . . to the limitations of the forge or press," says engineer. But when a casting is substituted, the designer lets his fancy roam, and foundry protests go unheeded.—Page 1020

"Piano" Electric Control Enables One to Do the Work of Two

One person can easily control a large number of auxiliary mill drives. Foot pedals reverse large motors so quickly that in 2 sec. they change from full speed in one direction to full speed in the other.—Page 1015

* * *

A Factory with No Assistants

"Assistants as a rule lack the necessary authority to accomplish much," says Chevrolet foundry manager. Below the general foreman of a department, every man has to be a specialist.—Page 1016

* * *

Foundry Costs Cut in Half in Ten Years

Impression that the foundry industry has lagged is erroneous, says automobile foundry superintendent. Output per man in his plant is close to three times what it was in 1919, and further gains are in prospect.—Page 1016

* * *

Hot Melting Improves Poor Pig Iron

Good results are obtained by one foundryman by raising temperature to 2850 deg. F. at the spout. Castings stand sudden temperature changes without cracking.—Page 1019

* * *

"Capital Mobility" Is a Big Factor in Industrial Success

In the early stages of an industry it is a grave mistake to sink too much capital in plant and equipment. During this period, the producer must hold himself ready to change quickly as new competitors show the way.—Page 996

* * *

Solid Carburizers Are Required for Some Parts

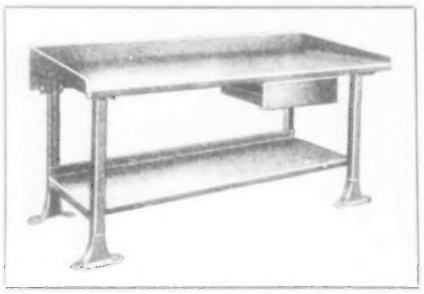
In these cases the carburizing, if done in pots or stationary containers, depends on the carburizer as a supporting medium to prevent sagging or weight warpage.—Page 1010

* * *

"Creep Resistance" Is Greater in Large Grain-Sized Material

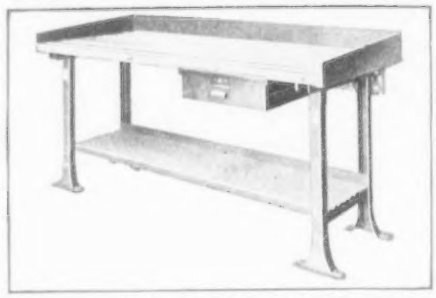
Therefore, it is doubtful whether it is wise to anneal to the finest grain those parts intended for high-temperature service.—Page 1006

NEW BRITAIN BENCHES



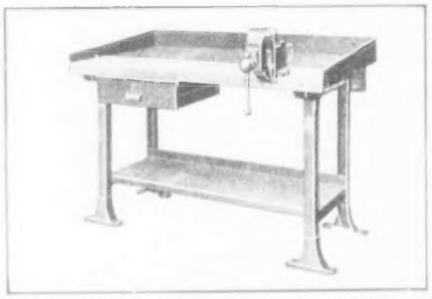
ALL STEEL SMOOTH TOP

SHOP FURNITURE ORIGINATORS NB



ALL WOOD MAPLE TOP

MADE AND STOCKED IN MANY SIZES AND COMBINATIONS INDIVIDUAL— CONTINUOUS— SINGLE OR DOUBLE



COMBINATION—WOOD AND STEEL TOP

TOPS MADE OF ALL STEEL ALL WOOD OR COMBINATION WOOD and STEEL NEW BRITAIN STEEL BENCH DRAWERS EASILY ATTACHED

ALL WOOD TOP BENCH

This top is made from 1¾" or 2¼" thick edge grain laminated maple planking, 10" to 12" wide, as required. This planking is made from Appalachian Hard Maple, kiln dried to not over 4% moisture content at time of working. In addition to being made with the best glue obtainable, each plank is tied through laminations in three to six places by heavy bolts. The bolt holes are counterbored and plugged. Each plank is finished, sanded and shellacked ready for erection.

The legs, sides and back and shelf are the same type as used on our All Steel Benches.

COMBINATION TOP BENCH

The Combination Top is a modification of the All Steel Smooth Top with a 1¾" or 2¼" thick, laminated edge grain maple vise plank front, 12" wide for the 24" and 30" benches and 18" wide for the 36" bench. The planking is exactly the same as used in the All Wood Top, and the legs, sides and back are the same type as used on our All Steel Benches.

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